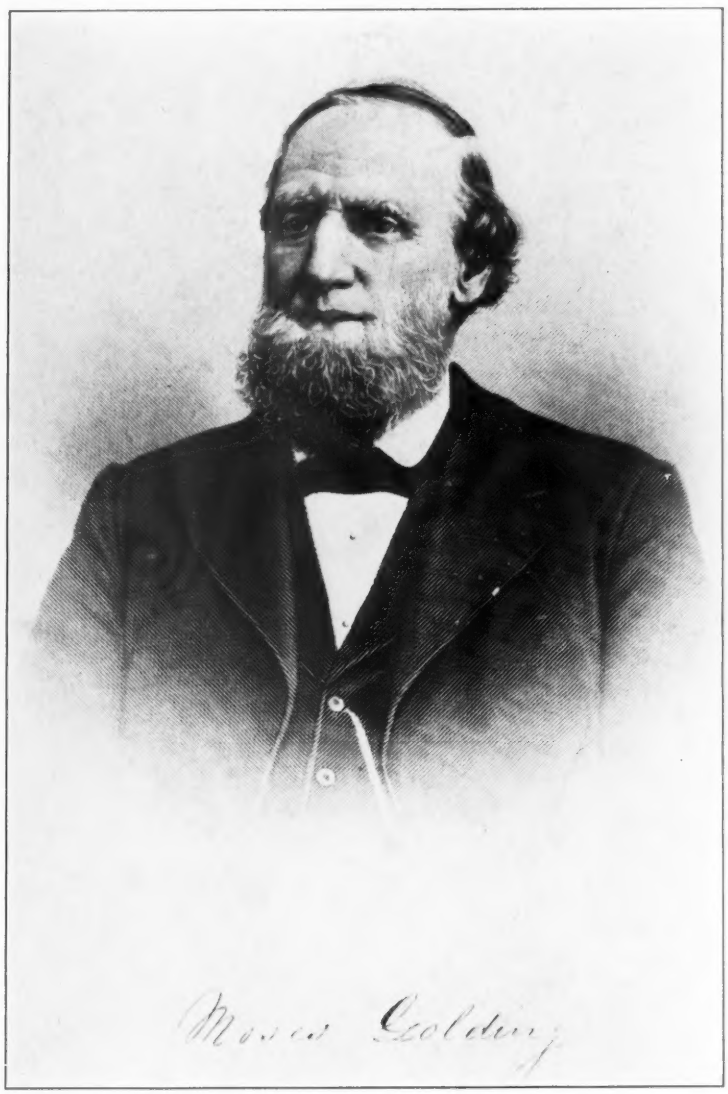
THE BULLETIN

OF THE

AMERICAN CERAMIC SOCIETY

Volume 19 JUNE, 1940 Number 6



MOSES GOLDING

For story, see page 205

MEET THE MAN IN BACK OF OUR RESEARCH LABORATORY

He wore sideburns, and brought up our first requests for help on production.

If your grandfather was in the business of making ceramic wares, the chances are he had production problems that were just as tough as those you run up against today. Maybe tougher.

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THE BULLETIN OF THE AMERICAN CERAMIC SOCIETY

Volume 19 **Contents for June, 1940** **Number 6**

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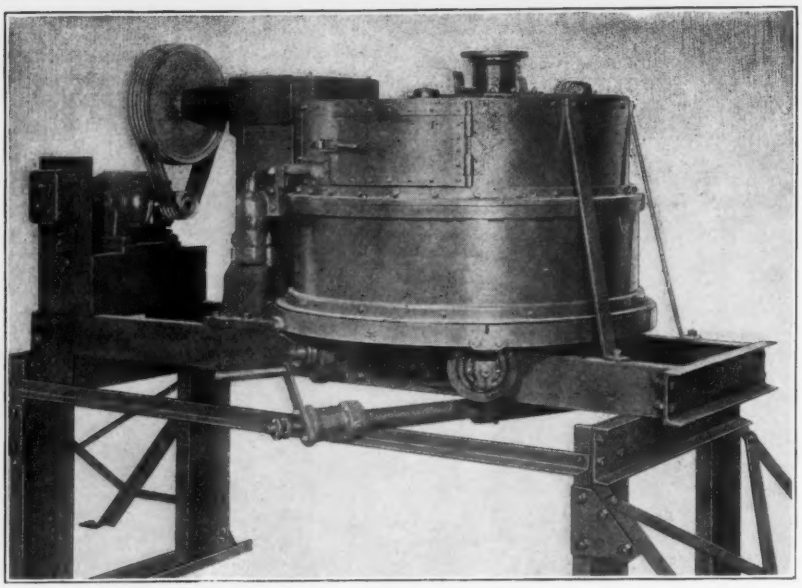

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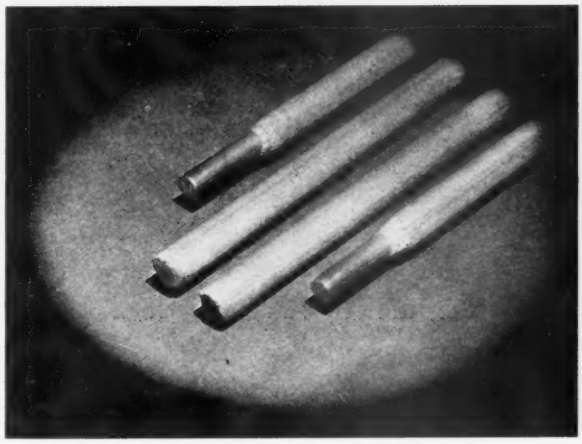

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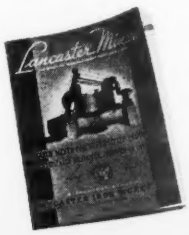

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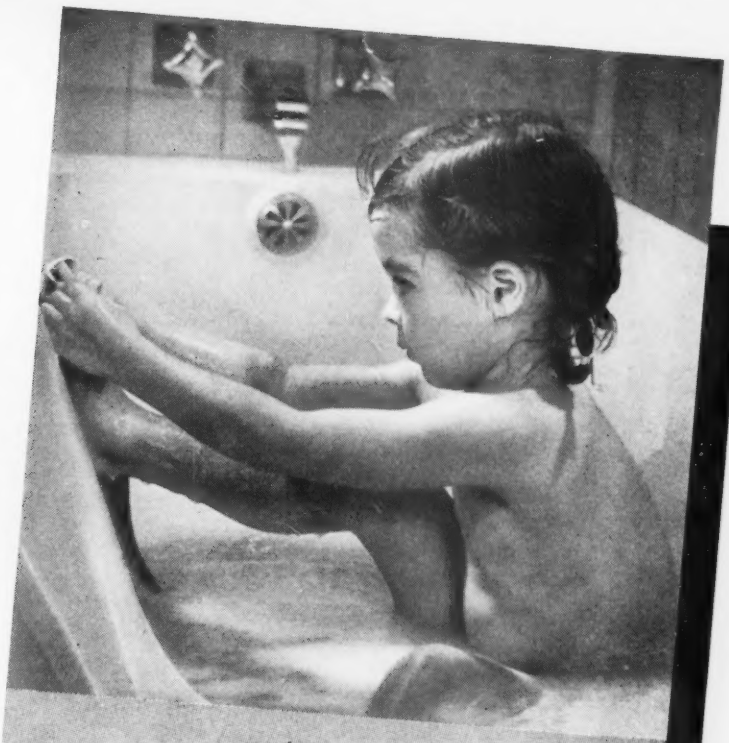

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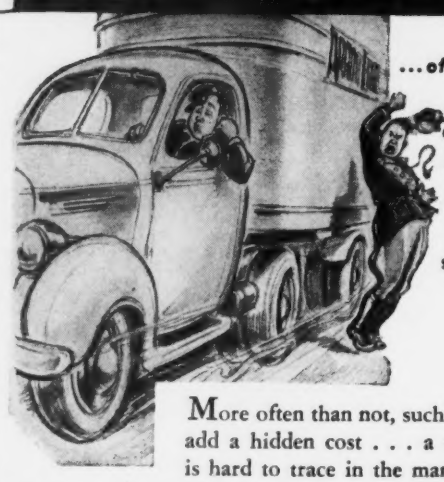
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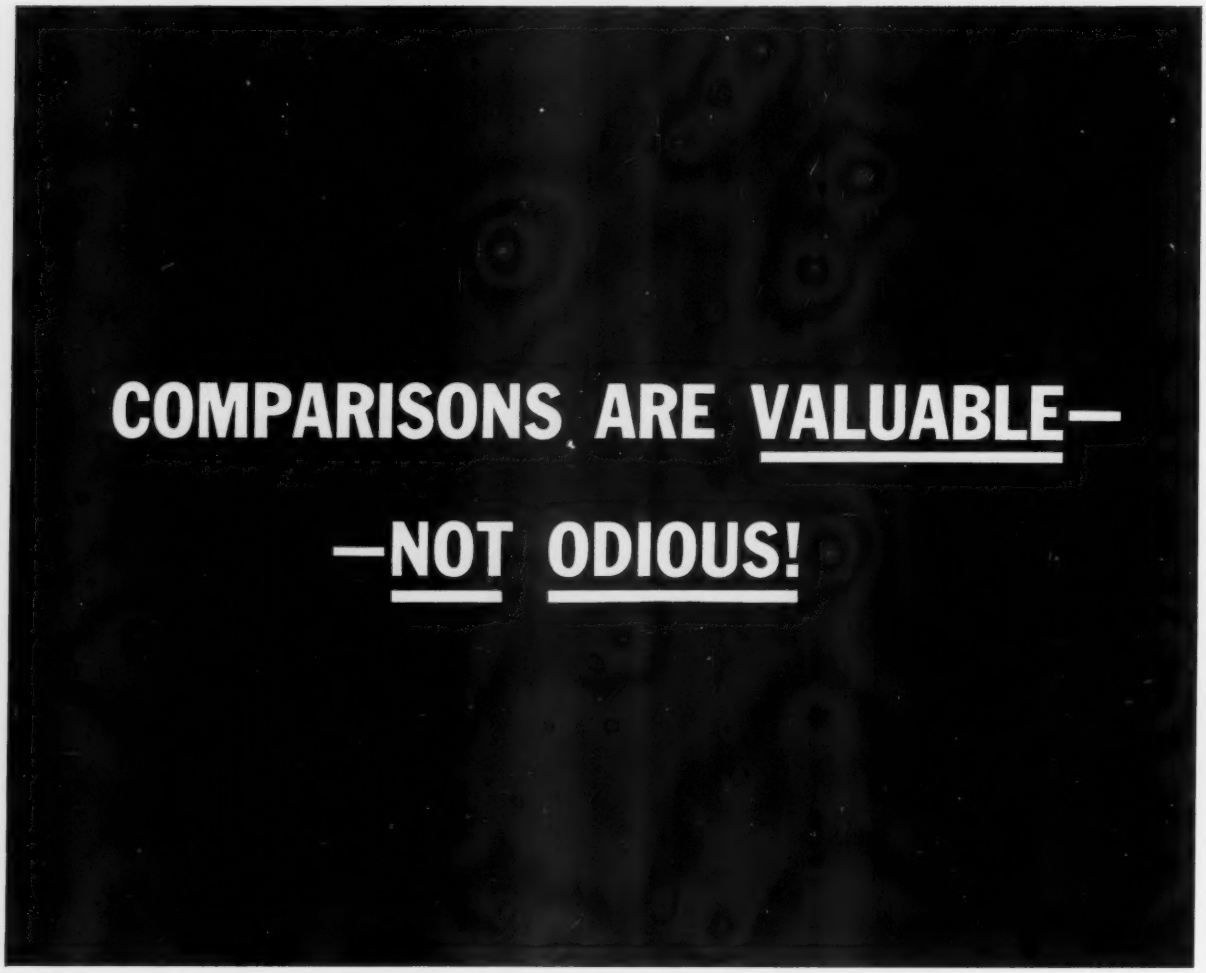

ON THIS page last month we gave a report on three typical Corhart tanks which, thus far in their lives, have turned out an average production of 116.2 tons of clear flint glass per square foot of melting area.

As manufacturers of tank blocks, it is natural that we should watch the performance of competitive materials. So far as we have been able to discover, no tank blocks other than electrically-cast materials have ever been able to show a three-tank average performance of more than one-third to one-half the figure of 116.2 tons per square foot of melting area, per life.

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THE BULLETIN

OF THE AMERICAN CERAMIC SOCIETY

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CERAMIC HISTORY

MOSES GOLDING*

Richard Golding, the father of Moses Golding, resided at Essingtonwood, Staffordshire, England, where he spent most of his life as superintendent of the coal mines and died January 1, 1837. His first wife was Charlotte, daughter of William Holden, a soldier in the English army; he was married twice afterwards. His children were (1) Richard, deceased; (2) Thomas, an engineer, settled in Trenton, New Jersey, in 1858, and died April 29, 1882, aged seventy-five years; (3) Sarah, first the wife of Joseph Hingeley, and after his death, of Joseph Wilkes, came to Trenton in June, 1846; (4) Mary, wife of Henry Bates, of Walsall, England; (5) John, an engineer, came to Trenton in 1854; (6) Ann, wife of John Burke, of Stoke-on-Trent, England; (7) Eliza, wife of Joseph Jones, of Georgetown, Maine; (8) Lydia, died young.

Moses Golding, the subject of this sketch, was the ninth child of Richard Golding. He was born at Essingtonwood, England, on January 19, 1819. At the age of eleven and one-half years, he went into the coal mines to work, and after three years he was put in charge of the engine of the mines. He was engineer there and at the Bilston Iron Works until he reached his majority, when he was made chief engineer at the Cheltenham Coal Mining Company's works of Forest-of-Dean, where he remained three years. Afterward, he had charge of the large engines at Great Bridge for two years and of the engines at the Bilston Iron Works.

Moses Golding left England on September 5, 1850, and sailed for New York, having saved of his earnings a few hundred dollars. He spent a short time in the rolling mills of Philadelphia and later in the machine shops at Cincinnati and Bordentown. In February, 1853, he came to Trenton, N. J., and for two years he was in charge of the engines of the Trenton Iron Company.

Enters Feldspar Business

In 1855, the firm of Gillingham, Golding, & Hargraves established a foundry and machine works in Trenton, which they carried on until 1865. The partnership was dissolved, and Moses Golding began the manufacture and preparation of flint and feldspar in a small way for pottery purposes on Lewis Street in Trenton, under the firm name of Golding & Company. This was the first establishment of its kind in New Jersey and probably the second in the United States. He carried on business here until 1868 and removed to the present location of the Company on Fair Street on the Delaware. Here, he erected commodious buildings, with three kilns, each ten feet in diameter, capable of producing two hundred tons per week. Joseph C. Gillingham and James Carr retired from the firm in 1868, the former disposing of his interest to Alexander Morrison, of New York, who died December 22, 1881.

In 1876, Mr. Golding erected flint and feldspar works at East Liverpool, Ohio, which produced about two hundred tons per month. The products of the works at Trenton and East Liverpool were used largely in their own localities, but shipments were made to Boston, Pittsburgh, and other parts of the country for use in the manufacture of pottery. Mr. Golding owned or leased a feldspar quarry near Wilmington, Delaware; at Topsham and Georgetown, Maine; a flint quarry at Castleton, Maryland; and a flint and feldspar quarry at Richfield, Connecticut.

In 1878, he began the preparation of a china clay from the clay beds at Hockessim, Delaware, and in 1881 at Brandywine Summit, Pennsylvania. This promised a large and increasing trade, and in both places he erected clay mills for manufacturing purposes.

Invents Pottery Machines

Mr. Golding invented several machines for the manufacture of pottery, which are used almost entirely in Trenton and other places, and to him alone is due largely the increased facilities of this branch of the industry at the present time (in 1883), compared with the early crude practices. He also had several valuable patents of his own for the preparation of pottery material.

Other Activities and His Family

Mr. Golding was classed among the thoroughgoing, enterprising business men of Trenton. Following the establishment of his residence in Trenton, he took a deep interest in church matters and was identified with the Methodist Episcopal Church from the time he reached his twenty-second year. He was officially connected with the State Street Methodist Episcopal Church of Trenton from 1860 until 1872, when he became one of the founders of the Hamilton Avenue Methodist Episcopal Church of Chambersburg and was president of its board of trustees until 1881.

He was united in marriage December 24, 1839, to Elizabeth, daughter of William Cook and Esther Buffin, of

* Edited from The History of Burlington and Mercer County, New Jersey, 1883, by Woodward and Hageman.

Ruardean, Gloucestershire, England, who was born January 12, 1822.

Their children were Mary, wife of Daniel McKenzie, of Chambersburg; William, a graduate of the Polytechnic College of Philadelphia, who was superintendent of the flint and feldspar works at Trenton; Edwin, who was superintendent of the china clay mills in Delaware; Moses, who was superintendent of the East Liverpool works, Ohio; Martha; and George, who was superintendent of the Brandywine Summit works, Pennsylvania.

Note from Edwin Golding to Charlie Golding

Wilmington, March 29, 1922

Flint and feldspar grinding was begun in an annex built to the machine shop and foundry plant of Gillingham, Golding, & Hargraves on Lewis Street around 1864 or 1865. Three pans, a pair (or set) of chasers, and a calcine kiln composed the establishment.

The new business subsequently outgrew and superseded the old, and James Carr and Alexander Morrison, both of New York, N. Y., superseded Gillingham and Hargraves in the ownership. Three or four years after the origin of the new business, the increase in trade demanded an extension of the plant, which was secured by purchase of the Brooks Paper Mill on the water power and the addition there of several more pans, chasers, and another kiln. For a time, operations at both plants proceeded simultaneously, but presently the entire capacity was located at the water-power plant; the Lewis Street buildings were appropriated by Thropp, McKenzie, and Wilkes, who had succeeded to the machine and foundry business.

The next change of ownership came about through the purchase by Mr. Morrison of Mr. Carr's interest, the purchaser (Morrison) thus becoming two-thirds owner and my father, the owner of the remaining one-third, but also the practical manager of the business.

In 1880, Mr. Morrison's health failed, and he proposed that my father buy from him one-sixth of the business, thus making them equal owners. Mr. Morrison retired to "silent partnership."

This proposal was made feasible by the assistance of loans of $5000 each from my father's two older sons, and (probably in June or July, 1881) your father succeeded to Mr. Morrison's job at a salary.

In a practical way, your father was of much more value to the growing business than Mr. Morrison could have been in his role, chiefly that of a bookkeeper.

The "clay washing" work was added in 1872, the operations being conducted at the water-power plant for the first six years. In 1878, the mill at the mines at Hockessin was erected, and the clay washing was transferred thither.

For the last forty-four years, this branch of the business has been prosecuted under varying vicissitudes at Hockessin.

(Signed) EDWIN GOLDING

DEVELOPMENT AND GROWTH OF THE FELDSPAR INDUSTRY*

BY H. B. DUBOIS

The growth of the feldspar industry in the United States is an interesting and important chapter in the growth of the ceramic industry. Some of the struggles, disappointments, and achievements of the pioneers in the feldspar industry are forgotten and unrecorded. We are able, however, to gather many facts from personal notebooks, diaries, and legal and business records.

New York State

The feldspar industry in Westchester County at Bedford, New York, was started in 1874 by Philip H. Kinkle. He came from New York, N. Y., in 1870 to farm, and the feldspar was discovered a few years later by a friend.

The first raw material was shipped to the Union Mills, Cherry Street, New York, N. Y. In 1891, this Bedford feldspar was ground in a mill near the mine.

The second largest producing area in the State (four miles west of DeKalb Junction, St. Lawrence County) was discovered by W. H. McLear in 1909. Shipments began in April, 1917, to grinding mills in Rochester, New York, and in Trenton, New Jersey. In 1929, a plant was built at DeKalb Junction by the Green Hill Mining Company.

The Gloversville Feldspar Corporation built a pilot mill at Cranberry Creek, Fulton County, New York, in 1919 for the purpose of developing chemically controlled feldspars. A larger mill was later erected, but it was destroyed by fire and never rebuilt.

Canada

The earliest record found on Canadian feldspar was an analysis of albite feldspar made in 1863 on rock from Bathurst, Ontario, Canada.

Shipments of crude feldspar probably began in 1888 from the Villeneuve mine located 20 miles north of Buckingham, Quebec. Shipments of 250 tons of rock were made to England and 150 tons to the United States.

The Templeton mine near East Templeton, Quebec, was opened in 1896 by J. H. Taylor of Ottawa, and crude rock was shipped to East Liverpool, Ohio. In 1898, the property was sold to McLaren and McLaren at sheriff's sale; in 1905, it was resold to the Electric Reduction Company and later to John Stewart, who sold it to John Wilkes of the Eureka Flint and Spar Company of Trenton, New Jersey.

The Quebec area did not produce much feldspar at this time because of the distance from pottery centers. Little more was heard of this section until about 1920.

In 1900, development work began near Verona, Ontario,

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* Extract from thesis presented for the professional degree of Ceramic Engineer, New York State College of Ceramics, Alfred University, June 13, 1938.

The writer is indebted to many men still active in the industry for assistance and facts concerning feldspar areas developed in more recent years.

In every case, a careful check has been made on facts and figures to give an accurate account of the history.

where high-grade feldspar and quartz were found with practically no iron-bearing minerals. The quartz and feldspar occur in large masses which are easily segregated. About 4000 tons were mined in 1900, Samuel Hunter being the principal operator.

The largest producing mine in Canada was known as the Richardson mine, opened in 1901 by Richardson and Sons of Kingston, Ontario, who mined under the name of Kingston Feldspar and Mining Company. This feldspar was deep red in color, high in potash, and with quartz masses in segregated areas. This quarry was said to have produced 250,000 tons of high-grade feldspar. In 1916, operating conditions in the pit were condemned by the Canadian Bureau of Mines. Since then, operations have been conducted on a smaller scale for short periods, and the refuse piles have been worked over, but the cost of mining at the present depth is not profitable.

Many other mines were opened in this section of Canada from 1900 to 1905, but none compared with the Richardson quarry in quality of feldspar or quantity of production. The Freeman and Reynolds quarries for a time produced some good feldspar.

In 1920, the bulk of the Canadian production shifted back to Quebec and to other parts of Ontario near Perth, Bancroft, Hybla, Sudbury, and Bathurst.

The Derry mine, second largest in Canada, was opened in 1919. It is located ten miles north of Buckingham, Quebec, a short distance from the Lievre River. The feldspar is high potash, and the rock is buff-to-white in color. For several years, the feldspar was hauled by scows to Buckingham Station in the summer and by ice road down the river in winter. Highway improvements now permit the use of trucks.

Another important mine in this district is known as the Cameron mine, which produces a very white crystal feldspar. Unfortunately, shipments can be made only in winter over five miles of mine road and three miles of ice road on the river.

There are probably fifty other mines in this section of Quebec that have produced small quantities of feldspar.

In 1911, the Dominion Feldspar, Ltd., built a mill at Parham, Ontario, designed for the production of chicken grit and stucco dash for building purposes. In a few years, the machinery was moved to another mill at Toronto, Ontario, but it was closed shortly after the Frontenac Floor and Wall Tile Company of Kingston, Ontario, built a mill in 1921. This mill now grinds feldspar from the Craig mine in the Bathurst district for use in its own tile plant and for sale.

The Pennsylvania Pulverizing Company of Lewistown, Pennsylvania, entered the feldspar field in 1921 with the construction of a grinding plant at Rochester, New York, known as the New York Feldspar Corporation. In 1922, the Company opened the Buckingham mine in Quebec, now known as the Cameron mine. The Rochester plant and mining properties were purchased by the Consolidated Feldspar Corporation in 1929.

Surface outcrops of feldspar near Quetachu Bay on the North Shore of the Gulf of St. Lawrence have attracted interest for the past 30 years, and some feldspar has been shipped, but there has been little activity since 1924. This deposit is particularly attractive because it is located at the water's edge. The dikes and stringers are rather narrow, and iron-bearing minerals are prevalent.

Connecticut

Around 1825, Brainard and Clark opened up a large number of deposits, mined a few tons in each until the cost increased, and then moved on to other locations. They took out only the best feldspar in each deposit and shipped the material in barrels to England on sailing schooners. There is scarcely a dike in Connecticut that does not show evidences of "ground-hogging" by Brainard and Clark.

The first feldspar mill in the United States, although very crude, was set up at the Toll Gate or Bidwell mine a few miles south of Middletown, Connecticut, some time around 1850. The material mined was said to have been a buff potash feldspar. The mill was erected in an open field and consisted of a set of chaser stones with a long arm attached to the crown gear. A yoke of oxen provided the motive power.

In May, 1866, George S. Andrews opened the Andrews Mine about two miles south of South Glastonbury, the largest feldspar mine in Connecticut. For three years, the mine production was shipped to Golding and Sons Company in Trenton, New Jersey.

In 1869, Mr. Andrews built a water-power mill on Hale Brook. He installed two batch mills, one wet pan, and one chaser stone. Later he sold the plant to the Husband family from Maryland, who organized the London White Lead and Color Company. The company failed in a few years, and the plant was taken over by Harry Andrews, son of George S. Andrews.

The Andrews mill burned in 1903, and some of the machinery was salvaged and erected in a grist mill by Louis Howe. This mill continued operations until 1928. The original Andrews mine is now known as the Louis W. Howe quarry.

The third mill in Connecticut was known as the Wiarda mill, built in 1902 at South Glastonbury and closed in 1912.

Maine

No doubt prospectors were scouting for feldspar in Maine as early as 1850, and it was some time between 1852 and 1860 that the first mining operations were undertaken. Jordan purchased the mining rights on a part of the farm of John W. Fisher in the Cathance district of Topsham. About 150 to 250 tons of rock were hauled down and dumped along the tracks of the new railroad. Why it was not taken to the Cathance River landing is not known, but after a few years, it was carted off to tide-water and shipped to Trenton. This was the first Maine feldspar to be used in Trenton to replace the English Cornwall stone, which was in general use at that time.

Jordan, in the late sixties, either transferred or leased his mining rights to Mr. Carr, a potter, from Grafton, West Virginia. Mr. Carr, his son, and a man named Ziegler worked the property rather casually for a while and sold it to Golding Brothers of Trenton, New Jersey. In the meantime, W. D. Willes operated quarries on the remaining 150 acres of the Fisher farm, and both operations were merged about twenty years later when Mr. Willes purchased the original Jordan rights. These quarries are still worked quite extensively.

In 1868 or 1869, Golding Brothers received rights to the

Georgetown property, which was destined to become one of the largest producing mines in the country. Several years later, the mine was operated by John W. Cummings and produced 17,000 tons in one year.

In 1869, the Trenton Flint and Spar Company sent Major George C. Willes to Topsham, Maine, to investigate the rumor that a considerable deposit of feldspar existed on the farm of Josiah Staples. Investigation on the Staples farm developed such promise that the Company purchased the property outright. Further mining proved the value of the deposit, and a moderate tonnage was shipped in crude form to Trenton. A mill site and water-power rights were secured from John W. Fisher on the Cathance River a mile below the quarry, and here in 1872 was built the first and, for many years thereafter, the only feldspar mill in Maine.

It was also about this time that Major Willes purchased his first pebble mill from England. The cylinder heads were made of heavy plate with a drilled hardwood plank lining. The cylinder lining was a white vitrified tile made by Fred Duggan of Trenton. It was a wonderful improvement and an important step in feldspar production.

Major Willes continued active management of the Trenton Flint and Spar Company until his death in 1918. He was rightfully the outstanding figure in pioneering and developing the feldspar industry in Maine.

The second mill to be built in Maine was erected at Portland some time in the nineties. A small company was formed called the Portland Mineral Company and its undertaking was chiefly notable in that it had the first continuous-feed-and-discharge pebble mills ever installed in Maine. The venture was unsuccessful.

In 1902, Norman G. Smith erected a mill at Auburn, Maine, near the Mt. Apatite mines. He had been connected prior to that time with the water-ground flint business at Conowingo, Maryland, in the firm of B. G. and J. C. Smith.

Pennsylvania and Maryland

The feldspar area in Pennsylvania is in the southeast corner of the State, in Chester and Delaware counties; and in Maryland, in the adjoining Cecil County. Baltimore and Howard counties in Maryland also produce large quantities of feldspar.

The Pennsylvania area ranked second in production in 1907, but very little mining has been done since 1920.

One of the first productive quarries in Pennsylvania was the Embreeville quarry near the station at Embreeville. Development began here in 1885, and the output was sold to Golding and Sons Company of Trenton, New Jersey. Operations stopped about 1910 because of water in the mine.

Around 1890, the Carpenter quarry was opened near Avondale. This was a deposit of fairly pure microcline feldspar and quartz in coarse masses. Some of this feldspar was sold to the manufacturers of false teeth.

The Sparvetta quarry was well known, although it was not the largest in the area. This mine was operated originally by the Sparvetta Mining Company and was located three miles southwest of Nottingham near the Maryland line. The feldspar in the veins at this quarry was a soda pegmatite with wall rock of dark-colored serpentine. The feldspar was delivered to a mill beside the quarry. At this plant, the rock was heated in a continuous-feed kiln and sprayed with water to shatter it, which facilitated grinding. It was crushed in chaser mills and ground in tube mills or in pebble mills. The ruins of the mill and the quarry, now full of water, may be seen at the present time.

Another well-known quarry was the Brandywine quarry worked by the Brandywine Summit Kaolin and Feldspar Company located not far from the Sparvetta quarry. Part of the output was ground at the Sparvetta mill and the remainder at the mill of the Brandywine Summit Kaolin and Feldspar Company at Brandywine Summit. This feldspar was of the soda variety.

Other mines in Pennsylvania that produced substantial quantities of feldspar were Chester Heights mine, Mendenhall mine, Boothwyn mine, and Chadds Ford mine.

The Brandywine Summit Kaolin and Feldspar Company was organized in March, 1887, to produce clay and feldspar. A mill was built at Brandywine Summit. This Company was the largest producer of feldspar in Pennsylvania; operations ceased, however, in 1920 when the mill burned. This plant mined feldspar throughout most its corporate existence at Elam, Pennsylvania, about one mile from the mill, as well as contracting for feldspar rock from other quarries, including the soda feldspar from the quarries in the area known as "The Barrens," near Sylmar, Maryland. The Elam quarries were developed by Edward Worth about 1891 when the Brandywine Summit Kaolin and Feldspar Company abandoned its clay pits and concentrated on the feldspar business. This feldspar was of the orthoclase and potash-soda variety. In 1911 or 1912, the Brandywine Summit Kaolin and Feldspar Company acquired the soda-feldspar rights at Sylmar, Maryland, for a consideration of 200 tons of ground feldspar.

The Steel mill at Toughkenamon, Pennsylvania, was built in 1882, about five years before the mill of the Brandywine Summit Kaolin and Feldspar Company. This mill ground both potash and soda feldspars from mines in Pennsylvania and Maryland and was operated under the name of the American Feldspar Company. S. Harry Worth bought this mill in 1901 for the Pennsylvania Feldspar Company; the plant was destroyed by fire in 1928.

The Eastern Flint and Spar Company was organized in 1904 by a Mr. Gittings in Baltimore. For some years, a rather low-grade feldspar and flint for red granite enamelware was produced. This mill contained the old-type chaser mills and two continuous mills with no separating unit.

In 1914, Henry N. Hanna and B. S. Bonebrake took over the plant and organized the Product Operating Company. They continued to grind flint and feldspar and gradually improved the products of the plant. Modern grinding equipment gradually replaced the old-type machinery. In 1924, this plant was taken over by the Seaboard Feldspar Company and operated until 1928, when the company built a mill at Brookneal, Virginia. In 1929, the Baltimore plant was abandoned.

About 1911, a plant was built at Curtis Bay, Maryland, to extract potash and alumina from feldspar. This project, however, was very short-lived.

There were probably one hundred quarries operated in Maryland during the first fifteen years of the present century, but the industry in this State was hindered because

the feldspar was too intimately mixed with quartz and iron-bearing minerals, including biotite, which could not be economically separated. Much of the Maryland feldspar has been used for building purposes and as chicken grit.

The building of the Conowingo Dam over the Susquehanna River flooded an adjacent area and necessitated the abandonment of some quarries at Conowingo.

Many of the men interested in the feldspar business today came from the flint and feldspar-grinding companies in southeastern Pennsylvania and northeastern Maryland.

Delaware

Mansel Tweed built a mill at Tweed Station near Newark, Delaware, in 1870. This was probably the first mill in Pennsylvania, Maryland, or Delaware. It was abandoned about 1905.

In 1898, Golding Sons Company built a plant at Wilmington, Delaware.

There are no feldspar grinding mills today in Pennsylvania, Maryland, or Delaware.

North Carolina and Tennessee

A legend in North Carolina gives the Indians of that region the credit for being the first feldspar miners in the United States. A favorite source of mica for wampum, ornaments, and for trading purposes was mined in what is now known as the "Sink Hole" mine in the Bandana section of Mitchell County. Here, the Indians dug out the mica with the crude instruments available and soon learned that the rock they discarded was of value to the white man. According to legend, some of this semi-kaolinized feldspar was transported by sleds, ox-teams, and boats to the Atlantic Coast and shipped in 1744 to England for pottery manufacture. Evidence of workings by the Indians and crude stone implements have been uncovered in the pegmatite dikes of North Carolina, while mica ornaments have been found in mounds in that area.

About 1910, William E. Dibbell of Baltimore was prospecting for gem minerals in Mitchell County of North Carolina and became interested in the huge piles of feldspar rock discarded by mica miners; in July, 1911, he made the first carload shipment from North Carolina to the Golding Sons plant in East Liverpool, Ohio. The material was sorted out of the dump at the Flat Rock Mica Mine, one and one-half miles northeast of Penland, and cleaned by hand with steel brushes, under the supervision of Cebe Pitman as foreman. A few months later Dibbell received backing from banks in that section and organized the Carolina Minerals Company at Penland, North Carolina. The Golding Sons Company contracted for the output and advanced funds to pay for selected rock. Operations started at the Deer Park Mines, and the Company received $2.07 per long ton for the feldspar loaded on the cars. The miners worked eleven hours a day for $1.10. Shipments were made to the Golding Sons Company plants at Trenton, East Liverpool, and Wilmington. The mines, in general, produced microcline, but albite was found in scattered lenses.

The first grinding mill in this section was built at Erwin, Tennessee, in 1914, about 45 miles from the North Carolina mining center at Penland. The Company, known as the Clinchfield Mineral and Milling Company, was organized by Charles Ingram and financed by Blair and Company of New York, builders of the Clinchfield railroad; Charles Ingram was president. Shipments of ground feldspar, both microcline and albite, were made to the potteries in Ohio, West Virginia, and Pennsylvania.

In 1916, William Rockefeller took over the Clinchfield Mineral and Milling Company and changed the name to the Clinchfield Products Corporation.

From 1922 to 1924, an attempt was made here to wet-grind feldspar for the ceramic industry. Expensive grinding, classifying, thickening, and drying machinery was installed, but the mill never became a factor in feldspar production. The potters offered various reasons why they did not want this material, the most common reason being the presence of soluble salts that affected the slip consistency.

In 1920, Frank Fuller, D. G. Grason, and R. W. Lawson organized the Erwin Feldspar Company and built a grinding plant at Erwin, Tennessee. In 1926, this Company bought the Clinchfield Products Company plant.

The Crabtree Feldspar Company was organized in 1921 by H. A. Womack and others. This was a mining company and was sold to the Erwin Feldspar Company in 1924. The Crabtree Feldspar Company constructed a narrow-gauge railroad from Cass to the head of Crabtree Creek, a distance of ten miles, and developed a productive feldspar area, known as the Crabtree mines.

A mill was built at Micaville, North Carolina, in 1923 by the North State Feldspar Company. This mill was purchased by the Consolidated Feldspar Corporation in 1935 and was closed in 1936.

The Tennessee Mineral Products Corporation started as a mining company in 1921 with operations on Beaver Creek, Mitchell County, North Carolina. A year later, the Company ceased mining at this locality and acquired the Deer Park mines from the Blue Ridge Mining Company on October 1, 1922. In 1923, the Company built a continuous grinding unit at Bristol, Tennessee. A laboratory was installed and chemical analyses were furnished for each feldspar shipment. This Company built a modern plant at Spruce Pine, North Carolina, in 1927 and moved some of the machinery from the Bristol plant to the new site. The Tennessee Mineral Products Company is now a part of the United Feldspar Corporation and is the largest producer of ground feldspar in North Carolina.

The Feldspar Milling Company plant at Bowditch, North Carolina, was constructed in 1929.

The Southern Feldspar, Inc., at Toecane, North Carolina, was organized in 1930, and a plant was built there.

The Willms Company constructed a plant at Erwin, Tennessee, in 1923, which was purchased by Golding Sons Company in 1924.

In 1935, W. F. Deneen built additions to the old mill of the Clinchfield Products Company at Erwin, Tennessee, and formed the North Carolina Feldspar Company.

In 1925, the Erwin Feldspar Company was purchased by Golding Sons Company.

During 1928 and 1929, the Consolidated Feldspar Corporation was organized and acquired the plants and business of the Erwin Feldspar Company and the Willms plant of Golding Sons Company at Erwin. Companies and plants in other states which became a part of the Consolidated Feldspar Corporation about this time were (1)

the Maine Feldspar Co., Topsham and Auburn, Me.; (2) the Dominion Feldspar Co., Rochester, N. Y.; (3) the New York Feldspar Corp., Rochester, N. Y.; (4) the Bedford Mining & Milling Company, Bedford, N. Y.; (5) the Golding Sons Company, East Liverpool, Ohio, Trenton, N. J., Hockessin, Del., and Butler, Ga.; (6) the Clinchfield Products Corp., Erwin, Tenn.; (7) the Feldspar Division of Innis Speiden Co., Murphysboro, Ill.; and (8) the Kingman Feldspar Co., Kingman, Ariz.

The McKinney mine of the Consolidated Feldspar Corporation in Mitchell County, North Carolina, about five miles from Spruce Pine, is the largest mine in North Carolina. At the present time, it is approximately 1000 feet long, 100 feet wide, and 200 feet deep over about one-half its length. It has been estimated that this mine alone will continue to produce a large yearly tonnage for at least thirty years more.

Other important mines in North Carolina that are now or have been big producers are Hoot Owl, Crabtree, Deer Park, English Knob, Chestnut Flats, Goog Rock, and Branch mines, as well as mines in Madison County.

In 1917, North Carolina became the principal producing State and has held that position since, except in 1920 when Maine production exceeded North Carolina.

There is little feldspar found in Tennessee; this State, however, has been a large producer of ground feldspar for a number of years, the crude rock being shipped from mines in western North Carolina.

New Jersey

New Jersey has not produced crude feldspar, but the State has long been a large producer of ground feldspar, and it was only natural that Trenton should become a feldspar grinding center as well as a ceramic center.

Moses Golding was the pioneer feldspar grinder in the State. The Golding and Company consisted of three wet grinding pans, a set of chasers, and a calcining kiln. The name was changed about 1881 to Golding and Sons Company when Moses E. Golding, Jr., William Golding, Edwin Golding, and George Golding entered the business. This firm name was changed to Golding Sons Company on April 15, 1902.

Another flint and feldspar-grinding plant was built in East Liverpool, Ohio, in 1874, and one at Wilmington, Delaware, around 1898. The Wilmington mill was destroyed by fire in 1924. This same year the Golding Sons Company purchased the Willms plant in Erwin, Tennessee. A year later the Erwin Feldspar Company was purchased by the Golding Sons Company. The entire Golding organization is now a part of the Consolidated Feldspar Corporation.

The Eureka Flint and Spar Company was organized in 1895 by members of the Thropp family and is still one of the large flint and feldspar grinding companies in Trenton.

The Standard Flint and Spar Company also operates a mill in Trenton, built in 1925.

Virginia

The feldspar industry in Virginia, like that of North Carolina, was an outgrowth of the mica-mining industry. The mineral has been mined in several counties at various times, including Amelia, Hanover, Bedford, and Prince Edward counties. During the Civil War, Virginia produced considerable mica, and in 1915, during the World War, some feldspar was shipped from Virginia for the extraction of potash. The Seaboard Feldspar Company of Baltimore has been the principal operator in this State. In 1921, the Company took over the entire output of the Moneta quarry and ground at its Baltimore plant until 1928. A new plant at Brookneal, Virginia, was built in 1928 and the Baltimore plant was dismantled. The plant at Brookneal was the first and only grinding plant in Virginia.

Colorado

In 1906, Samuel Geijsbeek reported on the "well-defined veins of orthoclase" in Platte Creek and Clear Creek canyons, with quartz and feldspar occurring in Golden Gate Canyon, near Golden, Colorado.

The Coors Porcelain Company of Golden, Colorado, did some grinding for its own use, but it was not until March, 1926, that Colorado became a factor in the feldspar industry. In this year, the Western Feldspar Milling Company erected a mill in Denver, drawing supplies of crude feldspar from Canon City.

In 1937, the Colorado Feldspar Company built a modern mill at Canon City to grind for the glass industry. The supply of crude feldspar comes from the same district.

South Dakota

The Keystone Feldspar and Chemical Company, Keystone, South Dakota, shipped eight test cars of crude feldspar in 1924 to the grinding plant of the Isco-Bautz Company, just established at Murphysboro, Illinois. The crude rock was taken from the Hugo, Etta, and Peerless mines. The Keystone Feldspar and Chemical Company is considered to be the promoter of the industry in South Dakota. Crude shipments were made to Murphysboro until 1929 when the Consolidated Feldspar Corporation leased the Hugo mine and built a grinding plant at Keystone. This was the first feldspar mill in the State. South Dakota feldspar is a high-grade, gray-colored feldspar. Both potash and soda feldspar occur in the veins. The Hugo mine is unique in that the dike extends several feet above the surface as a "chimney rock."

The F. E. Schundler Company entered the feldspar business in 1936 by building a grinding mill at Custer, South Dakota.

The Abingdon Sanitary Manufacturing Company at Abingdon, Illinois, draws its supply of crude rock from the South Dakota dikes.

Ohio

The Golding Sons Company operated a mill in East Liverpool, Ohio, from 1874 until 1929, when the plant was taken over by the Consolidated Feldspar Corporation.

The Potters Mining and Milling Company, East Liverpool, ground Canadian feldspar for many years, but in recent years only flint clay has been used.

The Newell Mining and Milling Company at Newell, West Virginia, across the river from East Liverpool, ground feldspar from various areas for several years.

The Ferro Enamel Corporation of Cleveland, Ohio, added a flint and feldspar-grinding unit in 1933. The material produced is principally for its own use in the manufacture of porcelain-enamel frits.

Other mills in the State that have ceased to be a factor in the production are the Cleveland Feldspar and Products

Co., of Cleveland, Ohio, and the Rock Products Co., of Silica, Ohio.

New Hampshire

New Hampshire has become an important producing state in the last ten or fifteen years, in 1936 reaching third place in the production of crude feldspar, with 26,494 long tons. The State, however, ranked seventh in production of ground feldspar.

In 1922, the Golding-Keene Company built a mill at Keene, New Hampshire, and ground feldspar produced by the Keene Mica Products Company. This is the largest plant operating today.

The only other mill operating in the State is the American Mineral Products Company at Cold River.

Arizona

In 1923, feldspar deposits near Kingman, Arizona, Mohave County, were worked by G. I. Taylor. The crude feldspar was shipped to grinding mills in California. In March, 1924, the deposits were sold to the Kingman Feldspar Company.

The Consolidated Feldspar Corporation built a mill at Kingman in 1931 and began taking the entire output of the Kingman Feldspar Company. A large portion of the ground feldspar from Kingman is used in the ceramic industry in California.

California

Feldspar has been mined and ground in California for years by ceramic plants, largely for their own use. The American Encaustic Tiling Company and the Standard Sanitary Manufacturing Company have operated mines and mills.

In 1931, the Consolidated Feldspar Corporation bought the plant of the Flynt Silica and Spar Company at Los Angeles. This plant ground feldspar from Kingman, Arizona. It was destroyed by fire May 9, 1931, and thereafter grinding operations centered at Kingman.

Minnesota

There was some mining of feldspar in this State early in the century, but the mining was at a standstill from about 1910 to 1931. The Feldspar Products Company at Warroad, Minnesota, constructed a mill in 1931 in Lake of the Woods County and drew its crude supply from near by.

Texas

There are two feldspar deposits in Texas being worked at the present time. One is located in Gillespie County, near Fredericksburg, and worked by the Harmin Corporation of Houston, Texas.

The other deposit in Llano County is owned by Mrs. Moss, and shipments of crude feldspar are made to a glass company in Monterrey, Mexico.

Other States

Pegmatite dikes have been worked for feldspar in other states but have never become an important factor in the feldspar industry.

Among these are Vermont, Massachusetts, Tennessee, Nevada, Wisconsin, and Georgia.

Feldspar Grinding Plants in the United States

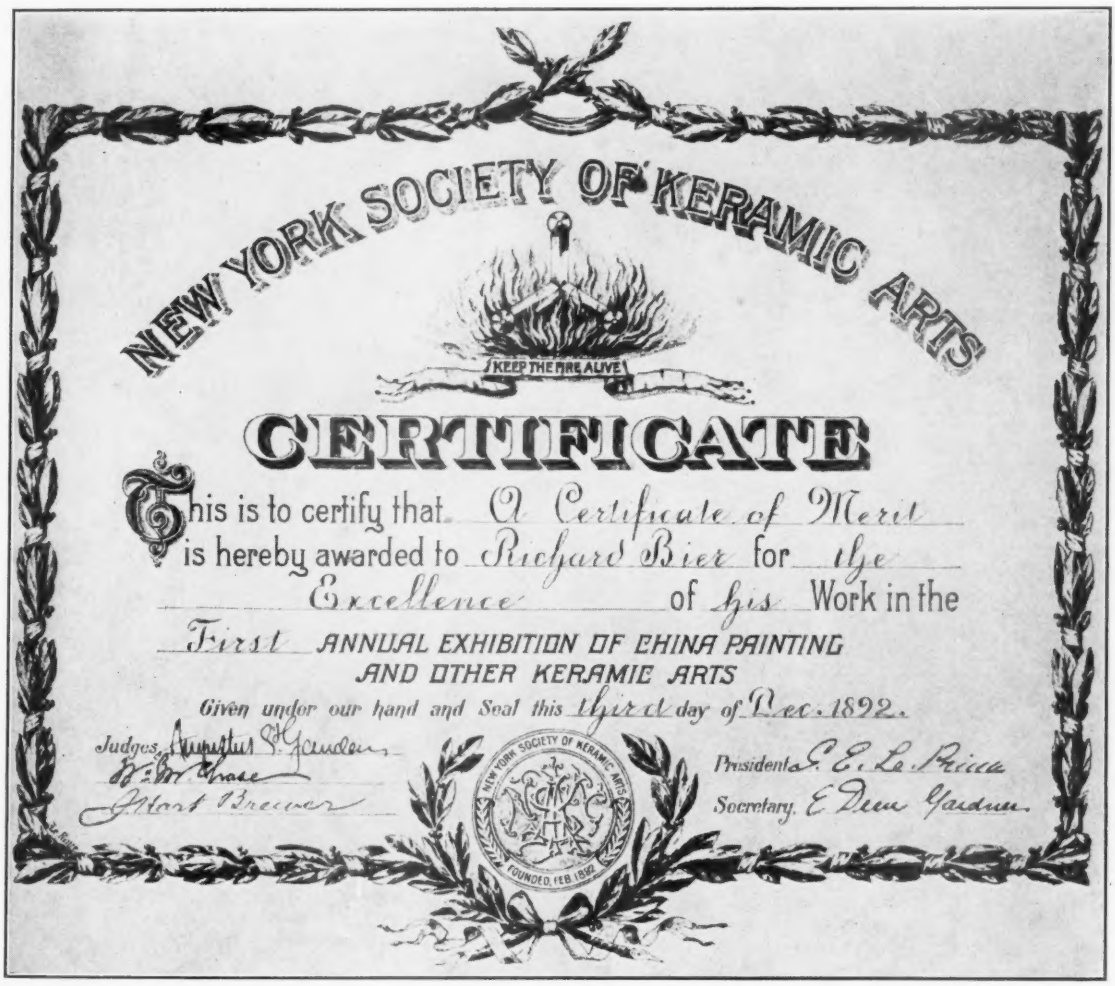
(1) Consolidated Feldspar Corp., Topsham, Maine.
(2) Oxford Mining & Milling Co., West Paris, Maine.
(3) Topsham Feldspar Co., Cathance, Maine.
(4) Ceramic Feldspar Co., Bath, Maine.
(5) Golding-Keene Co., Keene, N. H.
(6) American Mineral Products Co., Cold River, N. H.
(7) Orford Soap Co., Manchester, Conn.
(8) Genessee Feldspar Co., Charlotte, Rochester, N. Y.
(9) Consolidated Feldspar Corp., Rochester, N. Y.
(10) Green Hill Mining Co., Inc., DeKalb Junction, N. Y.
(11) Consolidated Feldspar Corp., Bedford, N. Y.
(12) Consolidated Feldspar Corp., Trenton, N. J.
(13) Eureka Flint & Spar Co., Trenton, N. J.
(14) Standard Flint & Spar Co., Trenton, N. J.
(15) Seaboard Feldspar Co., Brookneal, Va.
(16) Ferro Enamel Corp., Cleveland, Ohio.
(17) Consolidated Feldspar Corp., East Liverpool, Ohio.
(18) Consolidated Feldspar Corp., Erwin, Tenn.
(19) North Carolina Feldspar Co., Erwin, Tenn.
(20) Southern Feldspar Co., Toecane, N. C.
(21) Tennessee Mineral Products Co., Spruce Pine, N. C.
(22) Feldspar Milling Co., Bowditch, N. C.
(23) Feldspar Products Co., Warroad, Minn.
(24) Consolidated Feldspar Corp., Keystone, S. D.
(25) F. E. Schundler Co., Custer, S. D.
(26) Abingdon Sanitary Mfg. Co., Abingdon, Ill.
(27) Colorado Feldspar Co., Canon City, Colo.
(28) Western Feldspar Milling Co., Denver, Colo.
(29) Consolidated Feldspar Corp., Kingman, Ariz.
(30) Gladding-McBean Co., Los Angeles, Calif.
(31) Standard Sanitary Mfg. Co., Campo, Calif.

Chronological Index

Date	State	Production Data
1744	N. C.	"Sink Hole Mine," operated by Indians.
1825	Conn.	Brainard and Clark mined some feldspar, shipped in lump form to England.
1850	Conn.	Chaser stones set up at Bidwell mine; oxen used as motive power; first mill in U. S.
1850	Me.	Prospectors searching for feldspar.
1852–1860	Me.	First mining operation started by Jordan at Cathance on Fisher farm.
1863	Canada	Analysis of albite feldspar at Bathurst on record.
1865	Trenton, N. J.	Gillingham, Golding, and Hargraves started on Lewis St.
1866	Conn.	Andrews mine opened in Conn.; feldspar sold to above Company; now known as Howe mine.
1868	Me.	Jordan leased mining proper to Carr (a potter) and Ziegler.
1868	Me.	Golding and Co. acquired Georgetown mine; shipped rock to Trenton by schooner; moved plant from Lewis St. to Fair St.
1869	Conn.	Andrews mill built on Hale Brook.
1869	Me.	Trenton Flint and Spar Co. sent G. D. Willes to Topsham to mine feldspar on Staples farm.
1870	Del.	First mill built at Tweed Station near Newark by Mansel Tweed; wet grinding mill.
1870	Me.	Carr sold mine to Golding Co.
1872	Me.	Trenton Flint and Spar Co. built drag-pan mill at Cathance, one mile below quarry; first mill in Me.
1874	Ohio	East Liverpool plant constructed by Golding & Sons.
1874	N. Y.	Operations started at Bedford; shipped crude until 1891; started by Kinkle.
1881	Trenton, N. J.	Moses Golding, Sr., controlled Golding & Co.

Date	State	Production Data
1882	Me.	Railroad transportation provided from Cathance.
1882	Pa.	Steel mill built at Toughkenamon.
1882	Me.	First cylinder mill introduced at Cathance by G. D. Willes.
1885	Pa.	Embreeville quarry opened; supplied Trenton.
1887	Pa.	Brandywine Summit quarry opened by Brandywine Summit Kaolin and Feldspar Co.
1888	Canada	Shipment of crude feldspar from Villeneuve mine to England and U. S.; Taylor, Arnoldi, and Bowie, pioneers.
1888	Me.	W. D. Willes property merged with Golding Co. mines.
1890	Me.	Second feldspar mill in Me. built at Portland by Portland Mineral Co.; date not exact; first continuous mill in industry.
1890	East Liverpool, Ohio	Potters Mining and Milling Co. started.
1890	Pa.	Carpenter quarry opened in Pa.
1890	Canada	700 tons output reported.
1891	N. Y.	Chaser stone mill set up at Bedford.
1892	Pa.	Chester Heights quarry opened.
1895	Trenton, N. J.	Eureka Flint & Spar Co. organized.
1896	Canada	Operations began at Templeton mine in Quebec; first mine in Quebec and first large-scale operation in Canada; prospecting near by, later became Richardson mine.
1898	Pa.	Eureka Flint & Spar Co. opened Thompson quarry.
1898	Del.	Golding Sons Co. built plant at Wilmington.
1900	Pa.	Joseph Wilcox, geologist, tried to interest J. Rogers at Brandywine Summit in N. C. feldspar discarded by mica miners.
1900	Canada	Sam Hunter prospecting for Harry Richardson.
1901	Pa.	H. Worth took over Steel mill at Toughkenamon; Pennsylvania Feldspar Co. started.
1901	Canada	Richardson mine opened; Verona quarries opened.
1902	N. C.	Some feldspar from N. C. shipped to Trenton mills from mica mines.
1902	Ohio	Golding & Sons Co. became Golding Sons Co., April 15.
1902	Me.	N. G. Smith started in Me.; built mill in Auburn.
1902	N. Y.	Pennsylvania Feldspar Co. built mill at Rochester to grind Canadian feldspar; sold Richardson feldspar east of Pittsburgh; Potters Mining and Milling Co. sold west of Pittsburgh.
1903	Conn.	L. W. Howe mill built at South Glastonbury.
1904	Md.	Eastern Flint & Spar Co. organized in Baltimore.
1905	Canada	Sam Hunter prospecting for Harry Richardson.
1909	N. Y.	DeKalb Junction deposits discovered by W. H. McLear.
1910	N. C.	William Dibbell located in N. C., searching for gem stones; employed by J. M. Manor.
1911	N. C.	William Dibbell shipped first carload from N. C.
1911	N. C.	Carolina Mineral Co. organized at Penland.
1911	Canada	Dominion Feldspar, Ltd., built mill at Parham; not successful.
1911	Md.	Plant erected at Curtis Bay for extraction of potash from feldspar.
1912	N. C.	Narrow-gauge railroad built from Penland to Hoot Owl mine.
1914	Tenn.	Clinchfield Mineral and Milling Corp. formed; beginning of grinding in South.
1914	Md.	Eastern Flint & Spar Co. taken over by H. N. Hanna and B. S. Bonebroke; Product Operating Company formed.
1915	Va.	Feldspar mined for extraction of potash.
1916	Canada	Dominion mill moved from Parham to Toronto.
1916	Ga.	Mill erected at West Point for extraction of potash from feldspar.
1916	Canada	Richardson mine closed; condemned by Canadian Bureau of Mines.
1917	N. Y.	Green Hill Mining and Milling Co. started shipments April 1.
1917	N. C.	N. C. ranking first in production.
1917	N. Y.	Dominion plant built at Genesee Dock.
1919	Canada	Derry mine opened.
1919	N. Y.	Gloversville Feldspar Co. started at Cranberry Creek.
1920	Tenn.	Erwin Feldspar Co. organized; constructed mill at Erwin, Tenn.
1921	Md.	Seaboard Feldspar Co. took over Moneta quarry output; ground at Baltimore until 1928.
1921	N. C.	Crabtree Feldspar Co. started; sold to Erwin Feldspar Co. in 1924.
1921	N. Y.	Pennsylvania Pulverizing Co. mined in Quebec and Ontario; built mill at Rochester.
1921	Canada	Frontenac Floor and Wall Tile Co. started grinding.
1921	Md.	Seaboard Feldspar Co. at Baltimore ground entire output of Moneta, Va., quarry.
1922	Canada	Dominion mill at Toronto closed.
1922	N. H.	Golding-Keene Co. built mill at Keene.
1922	Tenn.	Clinchfield Products Co. constructed wet grinding plant.
1922	N. Y.	Genesee Feldspar Co. took over plant of Pennsylvania Feldspar Co. at Rochester.
1923	Ariz.	Feldspar deposits opened at Kingman.
1923	Tenn.	Willms plant constructed at Erwin.
1923	Tenn.	Tennessee Mineral Products Co. built plant at Bristol.
1923	N. C.	North State Feldspar Co. constructed plant at Micaville; operated by Dr. Sugget and R. Glatly.
1924	S. D.	Keystone Feldspar and Chemical Co. shipped eight test cars of feldspar to Murphysboro, Ill.
1924	Md.	Seaboard Feldspar Co. acquired Baltimore plant of Product Operating Co.
1924	Tenn.	Golding Sons Co. took over Willms plant.
1924	N. Y.	U. S. Feldspar Corp. took over Gloversville Feldspar Co.
1925	N. J.	Mill built at Trenton by Standard Flint & Spar Co.
1925	Tenn.	Erwin Feldspar Co. purchased by Golding Sons Co.
1926	N. C.	Tennessee Mineral Products Co. constructed plant at Spruce Pine.
1926	Tenn.	Erwin Feldspar Co. purchased Clinchfield Products Co.

Date	State	Production Data
1926	Colo.	Western Feldspar Milling Co. began operations at Denver.
1927	S. D.	C. L. Jackson (Philadelphia) had option on property; Keystone Feldspar and Chemical Co. started.
1927	N. C.	Tennessee Mineral Products Co. built plant at Spruce Pine.
1928	Va.	Seaboard Feldspar Co. built plant at Brookneal.
1929	S. D.	Keystone mill of Consolidated Feldspar Corp. started Dec. 1.
1929	N. Y.	DeKalb Junction plant of Green Hill Mining Co. built.
1929	N. C.	Feldspar Milling Co. started at Bowditch.
1929	United States	Consolidated Feldspar Corp. organized.
1929	Va.	Seaboard Feldspar Co. built plant at Brookneal; closed Baltimore plant.
1929	United States	United Feldspar Corp. took over Tennessee Mineral Products Co. and Oxford Mining and Milling Co.
1930	United States	Bureau of Standards Classification CS23–30.
1930	Canada	Canadian Flint and Spar Co. organized.
1930	N. C.	Southern Feldspar Co. organized at Toecane.
1930	N. C.	Southern Feldspar Milling Co. built plant at Toecane.
1931	Calif.	Consolidated Feldspar Corp. took over plant of Flynt Silica & Spar Co., Los Angeles; destroyed by fire same year.
1931	Minn.	Feldspar Products Co. constructed mill at Warroad.
1931	Ariz.	Consolidated Feldspar Corp. built mill at Kingman.
1933	Ohio	Ferro Enamel Co. built unit for grinding feldspar.
1935	Tenn.	N. C. Feldspar Co. started at Erwin, Tenn.
1936	S. D.	F. E. Schundler Co. started in feldspar business.
1937	Colo.	Colorado Feldspar Co. built mill at Canon City.
1939	N. Y.	Atlas Feldspar Corp., National Bank Bldg., Auburn; plant at Broadalbin.


NEW YORK SOCIETY OF KERAMIC ARTS
KEEP THE FIRE ALIVE
CERTIFICATE
This is to certify that A Certificate of Merit
is hereby awarded to Richard Bier for the
Excellence of his Work in the
First ANNUAL EXHIBITION OF CHINA PAINTING
AND OTHER KERAMIC ARTS
Given under our hand and Seal this third day of Dec. 1892.
Judges
President C. E. Le Prince
Secretary. E Dem Gardner
NEW YORK SOCIETY OF KERAMIC ARTS
FOUNDED FEB 1892

The seal and the laurel framing were designed by S. Elizabeth Le Prince (for story, see *The Bulletin*, January, 1940, pp. 45–46)

ACTIVITIES OF THE SOCIETY

COMMITTEE ON RESEARCH

Enamel

An intensive research program in porcelain enamels is being carried on by the Porcelain Enamel Institute with the assistance of many members of the Enamel Division. The Division Committee feels that there is a need for more concentrated effort on some of the more fundamental problems in enamel research.

Standard tests are being developed for enamels and enameled products (15).* These include abrasion resistance, acid resistance, reflectance, color variation, torsion, and chipping resistance. (Standard tests for the first three are published by the Porcelain Enamel Institute, 612 N. Michigan Ave., Chicago, Ill.)

General research is along the lines of obtaining higher covering power, thinner enamels, thinner ground coats, and greater chipping resistance. Reduction of the firing temperature of enamels is naturally of interest. Continued work is being conducted on such fundamental problems as adherence and suspension.

In a forum held by the Institute, grinding of dry enamel, measurements of viscosity and specific gravity, and the use of clay in ground coats were considered.

The effects of lithia to replace soda in vitreous enamel are being determined as to fusibility, thermal expansion, surface-abrasion resistance, crushing resistance, acid resistance, reflectance, and gloss of white cover enamel (5). The effect of lithia in glass is being investigated elsewhere (9).

Various enamel researches under way or recently completed include a study of the effects of varying alumina content on the properties of typical vitreous enamels (15); use of nepheline syenite in enamels (13); thermal expansion and refractoriness of typical commercial enamels (15); mechanics of adherence of vitreous enamels to metals (8); weather resistance of vitreous, enameled-iron structural units (15); opacification of vitreous enamels (8); identity and amount of fluoride crystals present in enamels (9); effect of enamel on strength of enameling iron (9); tearing of vitreous enamel; light sheet-iron ground coats (12); relation of conductivity and hydrogen-ion concentration to the properties of vitreous enamel slips (8); electrodialysis studies of clay and enamel slips (8); relation of defects in enamel coatings to hydrogen in steel (14) (enameling stock contains harmful quantities of hydrogen which appears during firing to cause blisters in the soft enamel and after firing to cause chipping of the hard enamel); phosphorus steels for vitreous enameling (14); and measurement of reflectance and developing a photoelectric method for measuring color difference (15).

Glass

Progress in glass research has been made by the careful and enlightening work on the constitution and X-ray structure of glass. An X-ray study of boric oxide-silica glass was made (6). The softening of silica glass by the addition of boric oxide results from replacing in random network fourfold-coordinated silicon by threefold-coordinated boron. The low expansion of vitreous silica as contrasted with the higher expansion of crystalline silica is explained by the impossibility of cooperative maneuvers in the random network of glassy silica. More work along similar lines has been conducted, such as an X-ray study of potash-silica glass and of lime-borate and lime-phosphate glasses.

It would be desirable to study the fundamental problem of immiscibility in glass on a somewhat broader basis as practically nothing is known on this subject from a scientific point of view. An attempt is being made to apply the results of crystal chemistry to the problem of immiscibility in glass systems (6).

There is now considerable interest in the field of phosphate glasses (7).

A new silica glassware has been developed at Corning. The glass is practically 96% pure silica and has a thermal expansion slightly greater than that of fused quartz. It stands sudden thermal changes without appreciable injury. The process for making this involves the forming, a heat treatment, and an acid extraction which leaves a skeletonlike structure of high silica glass, and a final heating which condenses the structure into a clear, solid mass.

The relation between chemical composition of the potash-lime-silica glasses and their densities, indices of refraction, and thermal expansions are being investigated (15).

In a study of the composition and physical properties of special glasses (15), the most significant work at the present time is that of establishing relations between the specific refraction of glass-forming oxides and the glasses made from such oxides. The data indicate that specific refractions are functions of the periodic arrangement of the chemical elements.

The properties of low-melting glasses are being determined, such as those used for overglaze-color decoration and other special purposes (5).

The effect of heat treatment on the dielectric constants of some soda-borosilicate glasses is being studied (5). This investigation is an attempt to explore the structure of glass by means of dielectric constant studies. The dielectric constants, densities, and refractive indices of eighteen glasses of the system Na_2O–B_2O_3–SiO_2 have been measured for a number of different conditions of heat treatment below the softening point. An attempt is made to interpret the processes which occur when a glass is cooled from the fluid condition.

The phase-equilibrium relations in the system sodium disilicate–barium disilicate are being studied by means of the quenching method (5). The refractive indices of the glasses are also being determined.

A study of the solubility of glasses in acid and alkaline solutions is under way (15). This includes cooperative work of The American Ceramic Society with the A.S.T.M., with special reference to methods for determining the relative solubility of glasses. Tests to determine the relative solubility of domestically made chemical glassware are in progress.

In recent work, the method for studying the durability of glass consisted of estimating dissolved alkali by pH determination (10). From the results obtained, the pH meter was found to be a useful tool which may well take the place of titration for the estimation of small amounts of extracted alkali. A comparison of titration and conductivity methods to determine the relative solubility has been made (15), and the results indicate that the determination of only one property of extracts, such as alkalinity or conductivity, may lead to erroneous conclusions concerning relative "solubility."

There has been much work on the durability and solubility of glass. An experimental study of various laboratory methods for measuring the durability of optical glass has been made (18).

In studying surface hardness of glass (18), attempts were made to determine the ability of different compositions to resist surface alteration of a type that would reduce direct light transmission. It has been found that this surface stability does not necessarily have any relation to structura stability or mechanical strength of glass. Various measures have been used by other investigators in estimating the hardness of vitreous surfaces. The Microcharacter instrument has received attention.

* Number in parentheses indicates where work has been or is being done; see list at end of report, p. 217.

Tests of hollow glass building blocks (15) have been made to determine the compressive and transverse strengths of walls made of glass blocks, their resistance to moisture penetration, and thermal conductivity.

Among glass researches recently completed or still being conducted are the system $MgO–B_2O_3$ (7); effect of alumina on devitrification of soda-lime-silica glasses; high-temperature viscosities of soda-lime glasses; surface-tension measurements on molten glass by a modified dipping cylinder method; a study of the requirements for "fine annealing" borosilicate crown glass blanks, especially those having irregular shapes (15); effect of time and temperature on accelerated chemical durability tests made on commercial glass bottles; dielectric loss of glass at high frequencies; solarization of certain glasses and their use for ultraviolet light measurements (7); reduction of glasses by hydrogen (7); and electrical conductivity of glass (9).

There has been and is at present considerable work on colorants. Researches include the coloring of glasses by silver and gold (7); development of ruby glasses (14); and work on vanadium oxide as a ceramic colorant (8). It has been pointed out that vanadium, as a glass colorant, acts much like chromium. Ordinarily it leads to green tints, which are due to the superposition of the green of trivalent vanadium and the yellow of pentavalent vanadium. A large excess of alkali leads to the formation of colorless vanadates.

Refractories

The efforts of the Division Committee have been to inspire research on refractories by setting forth what the important research problems on refractories are. There are a number of partially unexplored problems on the borderline between geology, physics, and chemistry. A problem selected was how thermodynamics may aid in filling the present blanks in our knowledge concerning interaction between the refractory oxides under heat and between the refractories and the substances against which they are used. An item for research which the Committee feels is worthy is the economic beneficiation of fire clays. More work should be done on the measurement of thermal conductivity.

Considerable work has been done and is being done on superduty refractories and insulating fire brick.

The Fellowship work of the American Refractories Institute (18) has had to do with the development of new test methods for use in controlling the quality of products and for the study of their probable behavior in service. The discoloration of silica brick (described as "mottled") has been studied. Normal and discolored brick, when compared in all their properties, indicated no significant difference. The darkened areas are caused by iron oxide in solid solution in the calcium-silicate glass.

New methods of testing the reactions of slags with refractories were compared (10). The slump and decrease in volume of $^1/_2$-inch spheres of slag resting on the refractories while they were fired to different temperatures gave more satisfactory results than the old penetration test.

Slag attack, it has been pointed out, may be considered as a simple solution process. One of the most important factors governing such attack is the diffusion coefficient of the dissolved material in the slag. The influence of higher solubility arises more from the increase in concentration gradient with its consequent accelerating effect on diffusion.

A field that needs to be studied and will be worked on more and more is that of unfired refractories, using the calcine only and a bond to make firebrick, e.g., chrome and chrome-magnesite.

An aluminous refractory has been developed using pyrophyllite, which does not require firing (4). It is dry pressed. Several bonding agents have been used successfully. The product meets all A.S.T.M. high heat-duty requirements.

Research problems concerning refractories being worked on or recently finished include an investigation of superduty refractory brick (13); a general investigation of insulating refractories (13); a study of steel-plant refractories (8); an investigation of a more satisfactory Bessemer bottom (13); various problems in refractories, including acid, basic, and neutral materials (14); the effect of reducing atmosphere on load-test values (8); a critical examination of the load test for refractories (6) in which long-time load tests were made, similar to creep tests for metals (it is suggested that a long test of this type would provide a more satisfactory standard than the short test now used); failure of boiler-furnace refractories (15); spalling of silica brick during the heating and cooling of furnaces; spalling resistance of refractory materials at low and high temperatures (15); elastic, plastic, and creep properties of refractories at several temperatures (15); length changes and endothermic and exothermic effects during the heating of flint and aluminous clays (15); gas permeability of refractory and insulating brick; the wetting of refractories by glass (7); the development of a stable zircon refractory (2); air-setting refractory mortars, wet and dry types (15); and the effect of water content and mixing time on the air-setting strength of refractory mortars containing silicate of soda (15).

Structural Ceramics

The National Paving Brick Association maintains a self-perpetuating research having to do with the problems which pertain to the manufacture and use of paving brick (13).

Research on the paving-brick unit is centered principally in an "acceptance test investigation." This consists of recording periodically the condition of brick on a test highway constructed with brick from sixteen different paving-brick plants and of testing in the laboratory the typical samples of each plant's brick, which samples were selected on the site of the test highway construction. By comparison of laboratory and field results, the investigation is a search for a physical test which will accurately predict the serviceability of a paving brick under present-day traffic.

Research on brick-pavement design consists of laboratory tests to determine the strength of vibrated monolithic brick-pavement slabs.

In materials associated with brick in pavements, research continues for the improvement of brick joint fillers (13).

A program of research being conducted under the sponsorship of the Glazed Brick and Tile Institute consists of an investigation of the fire resistance of glazed brick and tile and a study of the properties of porous bodies produced by the admixture of combustibles to the raw material. The relation of fire resistance to percentage of coring, design of unit, and physical properties of body, including thermal coefficients of expansion, are also being studied, as well as the resistance of porous bodies to weathering and the adaptation of ceramic glazes to these bodies.

Extensive experiments are being conducted on resistance to freezing, rate of water absorption, and weathering; and various other properties of brick are being studied in detail in connection with A.S.T.M. specifications (10). There is, at the present time, a study of pore structure and its relation to the resistance of brick to frost action (15).

A study is under way on the cause of disintegration of certain glazed structural units and the correction of this defect (13). Other researches include low-cost glazes for structural clay products (15); an investigation of the time factor in the fire-wall test of glazed brick (a secondary purpose in this investigation is the development of a more fire-resistant unit (13)); a study of electric kilns suitable for firing common brick (16); and an investigation of the physical properties of glazed and zinc-flashed brick (15).

Whiteware

The minutes of the meeting of the Whiteware Research Committee appeared in the February, 1940, issue of *The Bulletin*. The subjects discussed were classified into (1) thermal-history problems, (2) plastic and casting properties of clay, and (3) miscellaneous investigations. A survey of whiteware research, listing various problems, was made in this report.

In research on wall tile sponsored by the Tile Manufacturers Association, the improvement and standardization of simulative service tests for glazed and unglazed wall and floor tile have been covered (5); also the development of new methods for installing tile on walls, investigating the use of mastic cements as the adhesive for applying tile over sheet and insulating materials (5). An investigation of chemical-resistant, tile-grouting cements includes the development and application of cements, such as sulfur, resin, bituminous, and silicate types for joints of tile work in chemical plants and apparatus, etc. (5).

An investigation of the use of nepheline syenite in floor-tile and wall-tile bodies has been completed (13). The lower fusibility and increased fluxing action permit the formulation of bodies maturing at lower temperatures. Direct substitution of nepheline syenite for potash feldspar in wall-tile bodies lowers the absorption and moisture expansion and increases the shrinkage and mechanical strength.

Work is under way on the development of unfired white bodies to replace fired wall tile, switch porcelains, etc. (4). Several bodies using pyrophyllite and various bonding agents have been developed which have high strength and absorptions as low as 3% and which are unaffected by the severest autoclave tests. They have the appearance of white bisque bodies.

Researches on whiteware bodies include an investigation of bodies containing feldspar, steatite, and zirconium silicate (10); talc bodies (12); use of lepidolite as a flux in whiteware bodies (10); nepheline syenite in low-fire artware bodies (8); influence of uncommon minerals substituted in a typical two-fire vitreous china body (10); an investigation of the fabrication and properties of dental porcelain (13); and completion of the work initiated by TVA on the electric firing of fine china (17). There is an investigation on the effect of pressure on the properties of porcelains (13) and a project on electrical insulators (14).

A number of thermal-history researches are under way or reported, the latter having been presented in a symposium. Some of these include the effects of thermal history on the physical properties of porcelain; the effect of various temperatures and heating rates of whiteware bodies (15) (this study is being made with an electrically heated tunnel kiln); influence of firing and cooling curves on the character and properties of vitreous ceramic bodies (8); and the thermal history of the glassy phase and its effect on physical properties (7). There are two other investigations on the glassy phase in whiteware bodies (14, 15).

The effects of differential grinding on nonplastics as whiteware materials is being studied (2). Work along similar lines, the effect of fineness of grain of feldspar and flint, is under way (10). A symposium on this was held.

Other researches on whiteware include correlations of autoclave treatments and moisture expansion in service (15); length changes of clays and bodies during initial heating, and supplementary data on mica (15); eutectic fluxes in vitreous whiteware (8); considerable work has also been carried out during the year on a whiteware casting body for sculptural use with low-shrinkage characteristics (6). The body now used has a total shrinkage from the plaster mold of only 3%. In connection with this body, a considerable number of body colors has been made up in order to produce pieces of any desired shade.

There have been various glaze-fit tests suggested and used. A research has been reported on the stresses in porcelain glazes (6). A reaction between the body and glaze at the interface causes a development of stress above the softening point of the glaze. A mat glaze studied showed no crazing even though it was extremely high in tension, whereas a semimat and a clear glaze, lower in tension, showed crazed marks. Recently there has been an evaluation of the glaze-fit methods so far proposed (13). The tests include the so-called flat-plate test, the ring test, and modifications of Steger's test, namely, the tuning-fork and single-prong tests. In addition to taking comparative data, the effect of the glaze stress condition on properties of the ware was studied.

Work on colorants and stains at present or recently completed includes titanium stains for whiteware bodies (10); a mineralogical investigation of chrome-tin pinks (11); development of chrome-tin reds (10); uranium oxide as a ceramic colorant (8); stabilization of cobalt oxide as a ceramic colorant (8); the development of black ceramic pigments without the use of cobalt (the accepted method of producing stable black stains involves the use of appreciable quantities of cobalt oxide). Meager sources of supply and greatly increased use of the metal in alloys have made the cobalt stains very expensive. A stable substitute, therefore, would have wide application (5).

Studies on glazes include fundamental reactions of glaze constituents (15); eutectic aluminosilicate glasses in glazes (8); and eutectic borosilicate glasses in glazes (8). The spectrograph has been employed in determining the volatility of some glaze ingredients at different temperaperatures. Various possible uses of the spectrograph in ceramics are receiving attention, e.g., spectrographic analysis of vitreous enamel, spectrochemical determination of alkalis in ceramic raw materials, etc.

Materials

In the evaluation of clays for all uses, a brief syllabus for the approximate determination of the suitability of all but the common-brick type of clays is being set up (16). Later, a detailed syllabus for the precise determination of suitability of clays for the estimated uses will be worked out, and a series of determinations made on well-chosen samples of the major clay formation. Work is also under way on a qualitative scheme for the identification and classification of clays (1).

Further work is being carried on with the thermal-analysis method of determining clay minerals in raw clays (6). It would seem that the thermal method will be found particularly valuable to identify clay minerals when they occur either in such a finely crystalline state that the petrographic method is of little value or where they occur in mixtures in which the X-ray identification is difficult. This method has been found particularly valuable in the case of high alumina clays. Additional minerals have been tested to give standard thermal curves for the minerals, such as goethite, limonite, brucite, and manganite.

The hydrothermal synthesis of clays at high temperatures and pressures from a parent rock, such as feldspars, has been investigated for about five years (6). Most of the clay minerals have been produced directly from the rocks by allowing CO_2-charged water at high temperatures and pressures to percolate through a powdered specimen. In many cases, conversion is practically complete in ten days. It was found that in most cases an optimum rate of conversion occurs at about 300°C. At temperatures slightly above or below this, there is little or no change.

In a research on clays under way (6), it is being endeavored to eliminate the many variable factors which have not been previously tied down, such as particle size, adsorbed ions, and organic matter. Some new equipment has been developed in this work, such as improved types of dialysis cells and more precise methods of measuring viscosity.

A study of the methods of determining exchangeable bases in clays has been completed (14). Total exchange capacity can be determined by electrodialysis or by the leaching-distillation method. The time required for electrodialysis can be materially reduced by agitation of the clay slip during dialysis. Exchangeable cations of clays and similar materials are replaced slowly by percolation methods, but an agitation leaching-centrifuging procedure was developed which effects a rapid replacement. The effect of exchangeable bases on torsion properties of clays and on the absorption and transverse strength of clay bodies has been observed (14). A rational explanation of the behavior of clays with different exchangeable bases lies in the fact that their colloidal natures govern to a large degree their workable characteristics, and colloidal properties, in turn, are dependent on the water film surrounding the particle. The absorption and transverse strength of clay bodies, both in the fired and unfired state, are in-

fluenced greatly by the nature of the exchangeable bases present on the surface of the clay particles. Plastic clays with high exchange capacity are more affected than nonplastic clays, such as flint clays (14).

In studying the relationship between the chemical and physical behavior of clay slips, correlations otherwise obscured are brought out only if the clay is first carefully purified (7). A research is now under way to determine the influence on castability of such factors as grain size, pH value, character and amount of electrolyte, soluble salts, and base-exchange capacity (8). The ultimate object of this study is to find the best means of stabilizing casting slips and of simplifying the problem of their control.

There has been in the past and is now at present considerable investigation on the substitution of domestic clays for the imported clays. A study of the suitability of certain American ball clays and fractions of ball clays or other clays for general use is under way, and the bodies being tested contain only domestic materials (16). Extensive investigation has been given to the specially processed North Carolina kaolin, Kamec, in different whiteware bodies (13).

Washing of ball clays has been studied (16). The large-scale proving of the beneficiated clays is being done at Norris (17).

The decolorization of clays is receiving attention (5), and also the removal of iron minerals from clays and sands by froth flotation (7). A research on the use and purification of southeastern Missouri Cretaceous clays has indicated that some of the material is very good ball clay (11). An interesting new grinding process (the Micronizer) has found application in refining clay. The materials to be ground are pulverized by the impact of particles against each other. The machine not only grinds but classifies, producing a product of more uniform size.

Other current researches on clay include the investigation of heavy minerals present in ball clays (1); a study of the hydration and rehydration of clays (9); fundamental studies on the effect of exchangeable bases on the physicochemical properties of clays (14); electric charges of clay particles by electrophoresis techniques (7); effect of cations on the workability of certain clays (7); measuring plasticity of clays (3); and improving the firing range of a high lime clay (8). A comprehensive treatise on the relation of composition to properties of clays appeared in the May, 1939, issue of the *Journal*.

Concentration and purification of feldspar have received attention (16). Highly selective methods for separating soda and potash feldspars from quartz, both by froth flotation and table agglomeration have been worked on. Cationic reagents as collectors are necessary. A laboratory procedure was developed in which the coarse feldspar was agglomerated and tabled, and the fine feldspar was floated by lauryl amine hydrochloride and fluorine-bearing acids or salts in an acid circuit. The recoveries of feldspar were 96 to 98%. The use and purification of feldspar from Missouri granite (11) and the utilization of granite waste as a ceramic whiteware raw material (2) are being investigated. There is considerable interest in the beneficiation of various ceramic raw materials by means of froth flotation.

Extensive investigation has been carried out on the use of nepheline syenite (13). Its chief mineral constituents are nepheline, potash feldspar, and soda feldspar. In fundamental properties, it resembles potash feldspar, but it fuses at a lower temperature and has a wider sintering range. The marked fluxing action of nepheline syenite makes it possible to fire ware containing this material at a somewhat reduced temperature or to reduce the quantity of fluxing ingredient. Nepheline syenite has been used in making sanitary and electrical porcelain, semivitrous ware, floor and wall tile, and in porcelain enamels it can be used both as an ingredient of the frit and as a mill addition to the batch. The alumina and alkali content of the material, its fusibility, and the fact that it is readily taken into the melt make it a desirable addition to the glass batch.

Work on the concentration and purification of talc has been recently reported (16). Fibrous and foliated talc ores were beneficiated by froth flotation. Pine oil was used for foliated talc and reagents of the amine type for fibrous talc. The quartz was depressed without additional reagents, but tremolite and dolomite required additional basic or acidic reagents. The use of varying amounts of talc in a pressed whiteware body is being worked on (3) and also as a constituent of electrical porcelain bodies of clay, talc, and magnesia mixtures (10). Another investigation is on the interfacial reaction zone between certain glazes and high talc bodies (3).

The ceramic possibilities of zoisitic aplite are receiving attention (3). The predominant mineral constituent is plagioclase feldspar, between albite and oligoclase, but closer in composition to albite. Microcline feldspar is present in much smaller amount than the plagioclase component and free quartz is sparsely present. The use of aplite in floor-tile bodies is being studied (3).

A study of the properties of Garspar in ceramic bodies, enamels, and glasses has been in progress (18). This material consists of an exceedingly fine-grained mixture of quartz and processed glass, produced by a mechanical and chemical treatment which controls the composition and physical properties. A dustless batch-preparing process has been developed for compounding Garspar in glass and enamel batches.

Studies have been made on Pinite, the rock name of a replacement of an alumino-silicate mineral. The chief mineral is closely related to fine muscovite. The properties which lend it interest are its refractoriness (P.C.E. 32), ease of grinding, hardness and resistance to abrasion after firing, low firing shrinkage, relatively low and uniform reversible thermal expansion, resistance to molten enamel slags, etc. Pinite refractories have been used in rotary enamel smelting furnaces and in the cold zone and cooler linings of rotary cement, lime, and magnesite kilns.

The effect of heat treatment on the properties of a garnet abrasive has been studied (5). Garnet-abrasive grain was calcined at various temperatures above 1600°F. The properties of the calcined grains were compared with the untreated garnet as to crystal structure, hardness, and abrasive effect.

Other investigations include the beneficiation of spodumene (16); beneficiation of some Alabama glass sands (16); attrition scrubbing of glass sands (16); properties and uses of Pacific northwest diatomite (12); concentration of low-grade magnesite (16) (more work on eastern deposits is planned); and investigation of the physical properties of massive topaz (4) (a deposit of massive topaz has been discovered in South Carolina; the properties and its suitability for refractory purposes are being investigated; it has a P.C.E. of 40 and a permanent expansion of 0.76%); properties and uses of Washington olivine (12); olivine as a high-temperature refractory material (an electric-furnace study of the MgO–SiO_2 system is being made, using olivine as the principal raw material (17)); production of kyanite grog (several bonds which so far show promising results are being investigated further (4)); development of various grogs and sagger bodies using Virginia kyanite (3); special sagger mixes (12); serviceability of pottery plasters (10); and a fundamental study on plasters (14).

(1) University of Alabama, University, Ala.
(2) Georgia School of Technology, Atlanta, Ga.
(3) Virginia Polytechnic Institute, Blacksburg, Va.
(4) University of North Carolina, Raleigh, N. C.
(5) Rutgers University, New Brunswick, N. J.
(6) Massachusetts Institute of Technology, Cambridge, Mass.
(7) Pennsylvania State College, State College, Pa.
(8) Ohio State University, Columbus, Ohio.
(9) University of Illinois, Urbana, Ill.
(10) New York State College of Ceramics, Alfred, N. Y.
(11) Missouri School of Mines and Metallurgy, Rolla, Mo.
(12) University of Washington, Seattle, Wash.
(13) Engineering Experiment Station, Ohio State University.
(14) Battelle Memorial Institute, Columbus, Ohio.

(15) National Bureau of Standards, Washington, D. C.
(16) United States Bureau of Mines.
(17) TVA Electrotechnical Laboratory, Norris, Tenn.
(18) Mellon Institute, Pittsburgh, Pa.

The Division representatives of this Committee for 1939–1940 are as follows: Art, C. M. HARDER; Enamel, R. L. FELLOWS; Glass, WOLDEMAR WEYL; Materials and Equipment, V. J. ROEHM; Refractories, D. W. ROSS; Structural Clay Products, R. B. KEPLINGER; and White Wares, J. R. BEAM. —ARTHUR A. WELLS, *Chairman*, Homer Laughlin China Company, Newell, W. Va.

COMMITTEE ON STANDARDS

The American Ceramic Society is represented on many organizations dealing with standards, specifications, and methods of testing ceramic materials and products. This Report is made up principally from the reports of the various representatives on these organizations. It is compiled so that members of The Society may learn of the work that has been accomplished by these organizations on which The Society is represented. In cases where the member is interested in learning in more detail regarding definite work, he is referred to the publications of these organizations or to the representative of The American Ceramic Society on that organization.

American Foundrymen's Association

American Foundrymen's Association (L. C. HEWITT, Laclede-Christy Clay Products Co., St. Louis, Mo.): Some work is in progress with respect to refractories used in malleable furnaces, and consideration is being given to a résumé of cupola refractories.

American Society of Mechanical Engineers

American Society of Mechanical Engineers, Petroleum Division (H. R. STRAIGHT, Straight Engineering Co., Adel, Iowa): There have been no activities of this organization during the year of interest to the members of The Society.

Process Division of the American Society of Mechanical Engineers (W. KEITH MCAFEE, Universal Sanitary Mfg. Co., New Castle, Pa.): Nothing of interest to the members of The Society has been accomplished during the year.

International Chemical Congress

International Chemical Congress (ALEXANDER SILVERMAN, University of Pittsburgh, Pittsburgh, Pa.): This organization has had no meetings since May, 1938, but it plans to meet in England in 1940 in connection with the celebration of the one hundredth anniversary of the founding of the London Chemical Society.

National Research Council

Division of Chemistry and Chemical Technology, National Research Council (ALEXANDER SILVERMAN): Dr. Silverman attended the April and November meetings of the organization, held in Washington, D. C. The Committee on Chemical Data for Ceramists is the only committee serving in this organization whose activities would be of interest to the members of The Society. This Committee has gone over the more common chemicals which are of interest to ceramists and for which neither melting points, boiling points, decomposition, nor change in temperatures is available. These they plan to list and submit to the Chairman of the Division at the meeting on April 7, 1940, in Cincinnati, with the recommendation that mimeographed copies be prepared and submitted to research institutes, government bureaus, and graduate schools of universities. It is the hope of this Committee that some of these will be sufficiently interested to determine data not now available. Other physical data may also be missing, namely, density, hardness, normal crystalline form, and modifications thereof. Much remains to be accomplished in the field of exact properties of elements and compounds.

Division of Geology and Geography, National Research Council (R. B. SOSMAN, United States Steel Corp., Kearny, N. J.): For this Report, see this issue, p. 221.

International Association for Testing Materials

International Association for Testing Materials (S. M. PHELPS, Mellon Institute, Pittsburgh, Pa.): This organization has a proposal for the adoption of a Dutch method for determining true and apparent specific gravity as well as porosity. This was reviewed by the A.S.T.M. Committee C–8, and it is to be recommended that the A.S.T.M. procedure for determining these properties be considered by the I.S.A.

Glass Commission and Inter-Society Color Council

International Commission on Glass (J. C. HOSTETTER, Hartford-Empire Co., Hartford, Conn.): The work of the Committee on International Relations was directed toward the development of active participation by members of the Glass Division in the International Congress schedules for Germany in 1939. Papers were solicited along several different lines as follows: (1) One or two outstanding researchers were to present reports of their work; (2) reports by leaders on the cooperative researches which are carried on under the auspices of the International Commission; and (3) contributions by members in general.

Definite progress was being made on this schedule when word was received that the International Congress had been postponed from July, 1939, to 1940. In view of the present situation in Europe the Congress has been postponed indefinitely.

The mechanism by which standards developed by C–14 are to be transmitted abroad is not fully set up. This organization has had discussions on this subject, and it is probable that the American Standards Association will be the official channel, although the International Commission of Glass Technology will continue to function informally. After normal conditions are restored, this phase of the work can be set up in a satisfactory, workable arrangement.

Inter-Society Color Council (R. S. HUNTER, National Bureau of Standards, Washington, D. C.): During 1939, this organization completed the development of a simplified method of designating colors. Designed initially for describing the colors of drugs and chemicals, it is believed that this method will prove applicable to other situations where a scientifically standardized yet popularly intelligible system of designating colors is needed. The U. S. Department of Agriculture is preparing color charts which will facilitate use of the system for designating the colors of soils; ceramists may wish to examine the system's possible usefulness for designating the colors of minerals and ceramic deposits.

The organization is engaged in a study of color terms and their meanings when used in different professions. It is hoped that color language in the ceramic field may be surveyed in 1940 so that the extent of uniform usage may be made a matter of record. Eventually, the Council hopes to adopt a set of color terms and definitions which all industries and professions may use.

From a review of the interests of the different societies which compose the Council, it has been decided that the matter of greatest interest for immediate intensive study is the detection and description of small color differences.

Scheduled for study by members of the Council during 1940 are (1) tests for observers who do color grading and pass on color matches, (2) illuminants and inspection booths used for color matching, and (3) methods of measuring and expressing color tolerances numerically. A ceramist meets color-tolerance problems whenever he has to decide whether articles produced match the color of a standard with accuracy which will satisfy his customers. It is believed, therefore, that members of The Society will not only show an active interest in the color-tolerance project but in certain cases will want to participate in the work themselves.

One of the important functions of the Council is disseminating information about color. Four "News Letters" were published during 1939 and six are planned for 1940. Bibliographical items on color, information about color instruments, and other technical information are contained in the "News Letters" which, during 1940, will be examined by a member of the delegation for items of

special interest to ceramists. Such items, when found, will be submitted to the Secretary for republishing in *The Bulletin*.

Six papers comprising a Symposium on Color Tolerance were published during 1939 and are available from the Council. The meeting at which these were given was sponsored jointly by the Council and the American Psychological Association. Papers of a second symposium on color measurements in the pulp and paper industry, held in February, 1940, with the joint sponsorship of the Technical Association of the Pulp Industry, will soon be available.

American Society for Testing Materials

Committee A–1 on Steel, A.S.T.M. (H. F. STALEY, Metal & Thermit Corp., New York, N. Y.): None of the activities of this Committee during the past year had any relationship to the enameling of metals or any phase of ceramic manufacture.

Committee C–8 on Refractories, A.S.T.M. (N. W. TAYLOR, Pennsylvania State College, State College, Pa.): The activities of Committee C–8 during the past year are as follows: (1) one new tentative standard adopted, (2) revisions of two tentative standards, (3) tentative revisions of two standards, (4) raising of four standards from tentative to standard, (5) raising of three tentative revisions of standards to standard, and (6) withdrawal of two standards.

Mention might also be made of the preparation of industrial surveys pertaining to the lime and flat-glass industries.

Committee C–11 on Gypsum, A.S.T.M. (R. F. GELLER, National Bureau of Standards, Washington, D. C.): No developments of interest to The Society have taken place in the meetings of Committee C–11 during the past year.

Committee C–14 on Glass and Glass Products, A.S.T.M. (G. W. MOREY, Geophysical Laboratory, Washington, D. C.): This Committee held one meeting during the year, in Atlantic City, N. J., on June 29, 1938, during the annual meeting of the A.S.T.M. Most of the six subcommittees have been active. Consideration is being given to the preparation of tentative standards and to the development of fundamental information on which such standards are based. The following four test methods have now been developed which, after approval by Committee C–14, will be presented to the A.S.T.M. during the summer through Committee E–10 on Standards for publication as tentative: Methods of (1) Chemical Analysis of Glass Sand, (2) Hydrostatic Pressure Test of Glass Containers, (3) Polariscopic Examination of Glass Containers, and (4) Thermal-Shock Test on Glass Containers. (Subsequent to the annual meeting, Committee C–14 on Glass and Glass Products presented to the A.S.T.M. through Committee E–10 on Standards the following recommendations: Proposed Tentative Methods of (1) Chemical Analysis of Glass Sand (C146–39T), (2) Hydrostatic Pressure Test of Glass Containers (C147–39T), (3) Polariscopic Examination of Glass Containers (C148–39T), and (4) Thermal Shock Test of Glass Containers (C149–39T). These new tentative methods were accepted by Committee E–10 on August 24, 1939, and appear in the 1939 Book of A.S.T.M. Standards, Part II.)

Committee C–15 on Manufactured Masonry Units, A.S.T.M. (R. L. CLARE, Federal Seaboard Terra Cotta Co., South Amboy, N. J.): This Committee in recent meetings has continued the discussion of the properties of masonry units begun at the Symposium held on December 12, 1939. During the latter meeting, especial attention was paid to the subject of research on the durability of masonry units. Papers describing the research at the National Bureau of Standards and the New York State College of Ceramics were presented. Indications from incomplete data obtained at the Bureau are that the selection of some clay building brick may be made with greater certainty by a slight modification of the method for determining values of the saturation coefficient. The research at the N. Y. State College of Ceramics was concerned chiefly with products made in the State of New York. The data indicated that some of these did not show so close a relation between the physical properties usually determined in separate tests and resistance to thawing as the majority of brick manufactured in the United States. New methods for judging the qualities of these products were discussed.

The Committee also received a report on the investigation of paving brick being conducted jointly by the Ohio State Highway Commission and the Public Works Administration. Although the data are still too incomplete for drawing definite conclusions, the preliminary results seem to justify the belief that the investigation will provide a better basis for the development of standards for paving brick.

A progress report of the work of the Joint Committee on Efflorescence was heard and discussed.

The only actions of the Committee affecting standards are a proposed editorial revision of the Specifications for Clay Building Brick (C62–39T) and a recommendation to advance to standard the present Tentative Standard for Solid Load-Bearing Concrete Units (C145–39T).

Committee D–3 on Gaseous Fuels, A.S.T.M. (C. H. PARMELEE, Onondaga Pottery Co., Syracuse, N. Y.): Mr. Parmelee attended the seventh meeting of this Committee held October 12, 1939, at the Hotel Pennsylvania, New York, N. Y., at which procedural changes in voting by members of the Committee and its various subcommittees were adopted to expedite the work of this Committee. Progress reports were also made from the various subcommittees, covering sampling methods, specific-gravity determinations, calorific value, impurities, humidity, and complete chemical analysis.

It is unfortunate that the members of The Society have not become interested in the work of this Committee. Undoubtedly, the impurities in fuels and especially the sulfur impurities should be of the greatest importance to those interested in ceramics.

Committee D–9 on Electrical Insulating Materials, A.S.T.M. (L. E. BARRINGER, General Electric Co., Schenectady, N. Y.): Subcommittee V of Committee D–9 deals with porcelain and various similar ceramic materials, glass, etc. All other subcommittees deal with materials that are not ceramic.

During the past year, this Committee has worked on the formulation of standard procedure for testing porcelain for porosity by the dye penetration method and is reviewing certain minor changes in the water-absorption testing procedure for porcelain.

The Committee is also investigating the methods of testing to be applied to steatite materials. It appears that the present porcelain test methods, in general, will be applicable, but certain modifications are being considered to provide for the testing of different-sized test specimens.

This program on porcelain has not been completed, and there will be no changes in the A.S.T.M. in Atlantic City in June of this year.

The Committee has investigated methods of measuring power factor on glass, and it is quite probable that a paper regarding this subject will be presented at the annual meeting of the A.S.T.M. in Atlantic City in June, 1940.

Methods have also been formulated for testing pintype-line glass insulators. These are included in the A.S.T.M. publication as Tentative Standards D468–39T. In addition, methods for testing glass-spool insulators have been formulated and are included as Tentative Method D5550–39T.

American Standards Association

Sectional Committee on Minimum Requirements for Plumbing and Standardization of Plumbing Equipment (Project A–40), A.S.A. (P. D. HELSER, General Ceramics Co., New York, N. Y.): At the meeting of Committee A–40 held April 21, 1939, all of the subcommittees on different branches of the plumbing-fixtures industry reported progress. Federal Specifications WWP541 have been revised and a new commercial standard, SCS20–36, will follow. The next meeting of A–40 will be held in New York, April 19, 1940.

Sectional Committee on Coordination of Dimensions of Building Materials and Equipment (Project A–62), A.S.A. (FREDERICK HEATH, JR., Colonial Clays, Inc., Worcester,

Mass.): This project was initiated at the request of Bemis Industries and has been sponsored by the American Institute of Architects and the Producers' Council, Inc. After a preliminary meeting of interested groups in September, 1938, the Sectional Committee was authorized by the Standards Council, and the first meeting was held on July 13, 1939.

The Committee includes representatives of more than 40 different trade associations, engineering societies, and other organizations connected with the building industry. The Sectional Committee has been organized with an executive committee of ten members to supervise the program and to correlate the work under consideration or being developed by a number of the smaller research committees. Each research committee is identified with some particular type of building material to study proposals for coordination in relation to that type of material. Such research committees have been set up for structural clay products masonry, wood doors and windows, concrete and cast-stone masonry, steel windows, natural stone, and the lumber industries. Others are contemplated. The Chairman of the Committee on Structural Clay Products Masonry is H. C. Plummer, Chief Engineer, Structural Clay Products Institute, Washington, D. C.

The Committee is fortunate in having the services of Modular Service Association (formerly Bemis Industries) placed at its disposal. Through this organization, a great deal of progress has been made in developing coordination studies for review by the research committees. The studies have been based on a 4-inch increment of measure, which has been generally accepted as the most satisfactory basis for coordination. There have been numerous meetings of the research committees, and the Executive Committee reviewed the work in January, 1940. The Secretary of the Committee, M. W. Adams, has traveled extensively contacting scattered members of the Committee. With this motivating force, the Committee is well organized for this ambitious undertaking, and its studies should merit careful consideration by the many industries concerned (see also *The Bulletin*, p. 200, May, 1940).

Committee C–29 on Insulators for Electric Power Lines, A.S.A. (D. H. ROWLAND, Locke Insulator Co., Baltimore, Md.): No meeting of this Committee has been called for two or three years.

Sectional Committee on Specifications for Sieves for Testing Purposes (Project Z–23), A.S.A. (A. S. WATTS, Ohio State University, Columbus, Ohio): A standard specification for sieves was adopted by the National Bureau of Standards, the American Society for Testing Materials, and the American Standards Association. This specification covers woven-wire cloth sieves, round-hole screens (sieves), and square-hole, perforated plate screens (sieves) for precision testing in the classification of materials according to size (mechanical analysis, fineness, and particle-size determinations). The sieves covered by these specifications are intended for general use. A method of calibrating woven-wire cloth sieves is included as information in the Appendix.

Sectional Committee on Scientific and Engineering Symbols and Abbreviations (Project Z–10), A.S.A. (L. E. BARRINGER): In the annual report (*The Bulletin*, **17** [3] 142 (1938)) of the Committee on Standards of The Society, the scope of the work of this Committee was fully explained. This year, this Committee has adopted a proposed Revision of the American Tentative Standard on Letter Symbols for Heat and Thermodynamics, Including Heat Flow. Those members of The Society who are interested in heat, combustion, and heat flow will be interested in the symbols included for general thermodynamics, heat of reaction, and combustion and heat flow.

Sectional Committee on Specifications and Methods of Test for Safety Glass, A.S.A. (A. E. MARSHALL, Corning Glass Works, 501 Fifth Ave., New York, N. Y.): There has been no meeting of this Committee during 1939.

Illuminating Glassware

Illuminating Society and Luminous Glassware Guild (H. H. BLAU, Corning Glass Works, Corning, N. Y.): Activities of the Joint Committee on Illuminating Glasses of The Society, the Illuminating Engineering Society, and the Illuminating Glassware Guild have been confined to the work of the Subcommittee on Illuminating Materials. Comparative studies have been made of the methods used for evaluating light diffusion, both abroad and domestically, as applied to the general problem and mechanism. Considerable work has also been directed to the more specific problems of evaluating the characteristics of glass to obtain engineering design data for use in connection with tubular light sources such as the fluorescent ones.

Recommendations

The Committee on Standards of The Society urges greater cooperation of the Divisions with the work of this Committee. Undoubtedly the members of the Divisions have definitions and specifications which they would like to have developed by The Society.

—JOHN W. WHITTEMORE, *Chairman*,
Virginia Polytechnic Institute, Blacksburg, Va.

COMMITTEE ON CERAMIC EDUCATION

The duties of the Committee on Ceramic Education are stated under Article B XII (10) of the By-Laws of The American Ceramic Society (published in *The Bulletin*, **17** [10] 390 (1938)). Briefly, "the Committee shall act in an advisory capacity to the Board of Trustees."

The members of the Committee on Ceramic Education for 1939–1940 are F. H. Rhead, C. M. Dodd, E. H. Fritz, G. J. Easter, and N. W. Taylor, *Chairman*.

During the past year no special requests for information have come to the Committee from the Board of Trustees. Several classes of The Society have been active in studying educational problems during the year.

The Ceramic Educational Council, headed by J. W. Whittemore, has been continuing its study of undergraduate curricula in Ceramic Engineering. Some educators feel that there is a dangerous tendency to regimentation owing to several sources of pressure brought to bear on the various schools offering Ceramic Engineering curricula. If the various schools with their various faculties and facilities and geographical environments were to strive toward a common mean, the consequence would undoubtedly be a trend toward mediocrity. It would be much better for these schools to develop and strengthen their distinguishing characteristics on which their reputation is based. More attention should be given and is being given to course content.

The Institute of Ceramic Engineers through its own Education Committee, of which E. H. Fritz is Chairman, has been canvassing its own membership during the past year through the questionnaire method to obtain the reactions and opinions of the members in regard to Ceramic Engineering curricula and suggestions as to possible improvements (this issue, p. 230). A very gratifying response to this effort has been obtained, and it has produced some valuable information not only for Ceramic Engineering educators, but also for the undergraduates.

The Educational Committee of the Fellows, F. H. Norton in charge, has been studying the requirements for advanced degrees in ceramics at the several institutions.

The Subcommittee on Ceramic Technology has made an effort to find some unanimity of opinion as to what is technology as contrasted with engineering. One authority defines "technology" as the "science that treats of industrial arts and manufactures." That there is a good deal of confusion between the two terms is indicated by a recent report of a special committee of the Society for the Promotion of Engineering Education which states, "At present, engineering colleges constitute almost the sole agency for preparing young men for technological pursuits." This statement would appear to rule out all scientific schools as making any contribution to this end. The report goes on to say, "We believe that there are advantages in the parallel development of the *scientific-technological* and the *humanistic-social* sequences of engineering education." Later, a definition is given of "the engineering method" as

"the common denominator of the activities of engineers." The definition includes a number of features of a general character, such as "ability to think straight," but in particular it includes "reasonable skill in making approximations and in choosing the type of approach in the light of the accuracy required and the time available for solution, in sum, a foundation for engineering judgment." It also includes "understanding of the element of cost in engineering and the ability to deal with this factor just as competently as with technological factors." These engineering characteristics may perhaps be contrasted with technology, if the latter is viewed as applied science or as the body of scientific principles and organized factual data as they are related to the particular industry. It is generally agreed that education in Ceramic Technology requires the stressing of chemistry, physics, physical chemistry, mineralogy, and petrography and that undergraduate and graduate work in these subjects as they relate to the silicate and allied industries is highly desirable. New fields of application and sudden spurts of industrial progress as a general rule have been achieved through intensive study of the scientific-technological aspects of a problem rather than through "reasonable skill in making approximations."

—N. W. TAYLOR, *Chairman*,
Pennsylvania State College, State College, Pa.

CERAMICS IN THE DIVISION OF GEOLOGY AND GEOGRAPHY, NATIONAL RESEARCH COUNCIL

Because of the close association of ceramics with the mineral industries, The American Ceramic Society has for a number of years been represented by one member in the group of thirteen persons who constitute the Division of Geology and Geography of the National Research Council. Since I became The Society's representative, I have been accustomed to report to The Society on the activities of this Division (see *The Bulletin*, **16** [6] 249 (1937); **18** [2] 76 (1939)).

The Division holds an annual meeting in April and operates during the remainder of the year through an Executive Committee as well as through numerous technical committees and subcommittees whose members are not a part of the Research Council. Unlike other Divisions of the Council, the Division of Geology and Geography does not confine its sessions to its own small membership, but invites chairmen and members of committees to participate. At the annual meeting on April 29, 1939, there were sixty present and taking part in the presentation or criticism of the twenty-three committee reports. The recent issuance of the annual report (Mimeographed Report, National Research Council, Washington, D. C., December, 1939, 216 pp.) gives occasion to review those activities that may be of interest to ceramists.

The Division makes recommendations in its own field concerning the granting of post-doctorate fellowships for research, paid for from funds administered by the Research Council. Four such were approved in 1939, of which two may be classified as researches in general geophysics and one in paleobotany. The fourth, granted to John Booth Peterson (Ph.D., Iowa State College, 1936) for work at the University of California, bears the title "Relation of the Composition of Soil-Binding Material to the Stability of Soil Aggregates and the Resistance of Soils to Erosion." Some new information on the clay minerals may come out of this research.

Your representative was made a member of the Advisory Committee on Fellowships for the year 1939–1940.

Committee 14 on Sedimentation (P. D. Trask, U. S. Geological Survey, *Chairman*) reported that its Symposium on Recent Marine Sediments, consisting of thirty-four papers, was ready for publication in book form. This is now available (Recent Marine Sediments, Parker D. Trask, editor, Tulsa, Okla., 1939; American Association of Petroleum Geologists; price $5.00). One of the papers is by R. W. Grim on "Properties of Clays." The work as a whole should be studied carefully by any of us who are interested in the origin and age of the brick and tile clays.

Another activity of Committee 14 brings it into touch with our various committees on standards and definitions, namely, its Subcommittee on Terminology. Five reports are available in the reports of the Committee, of which the most recent is on "Chemical Siliceous Rocks," by the late W. A. Tarr. C. K. Wentworth, Honolulu Board of Water Supply, is chairman of this subcommittee.

Committee 10 on Preparation of a Handbook of Physical Constants of Geological Materials (Francis Birch, Harvard University, *Chairman*) reported that its chief remaining problem is that of editing and publishing, since most of the data have now been assembled and sorted. The American Ceramic Society has had a representative "standing by" to assist in this compilation; apparently this service is no longer needed and our committee of one may be discharged.

Committee 15 on Stratigraphy (Carl O. Dunbar, Yale University, *Chairman*) had completed six of the projected set of thirteen charts of stratigraphic correlations. Arrangements had been made with the Geological Society of America to bring out these charts as a special publication. The completion of the set will be a good occasion for a revision of The American Ceramic Society correlation of commercial fire clays (J. R. Chelikowsky, "Geologic Distribution of Fire Clays in the United States," *Jour. Amer. Ceram. Soc.*, **18** [12] 367–90 (1935)).

Committee 13 on Research in the Earth Sciences (N. L. Bowen, University of Chicago, *Chairman*), reporting for the first time, did not follow the line of action predicted in my earlier report of acting as a "committee on ways and means." Instead, it has organized as a pair of technical sections (geology and geography), the geologic section forming in turn six subcommittees to study special problems. The stated purpose of the Committeee is first to survey the field for research and then to do what it can to promote activity in a few branches, chosen as being the more important, the more urgent, or the more feasible. One of the subcommittees, (*d*) "Geology of Ceramic Materials," is headed by J. L. Gillson, mineral technologist and geologist of the Development Department of E. I. du Pont de Nemours & Co., of Wilmington, Del. The other members of subcommittee (*d*) are Herbert Insley, National Bureau of Standards, and G. R. Mansfield and C. S. Ross, U. S. Geological Survey. No detailed recommendations were presented by the ceramic subcommittee as its work was still under way.

Committee (6) on Geographical Studies of Mineral Distribution (Lewis F. Thomas, Washington University, St. Louis, *Chairman*) plans to consider (*a*) the effects of mineral technology in increasing or decreasing the importance of mineral deposits or mineral districts, and (*b*) the relationships of minerals in production and manufacturing, with respect to geologic distribution, transportation, ownership, and markets. I suspect that it is thinking harder about petroleum, iron ore, and copper than about clays and glass sands, but it may ultimately bring out principles and facts that are of interest to us on the economic side of ceramics.

—ROBERT B. SOSMAN
U. S. Steel Corporation, Kearny, N. J.

COMMITTEE ON SECTIONS AND DIVISIONS

I. Promotional Work in Connection with Proposal to Organize Portland Cement and Gypsum Divisions of The American Ceramic Society

By means of correspondence and personal interviews we have called to the attention of the cement and gypsum companies the benefit they would obtain by affiliating with The American Ceramic Society and by participating in its activities. All of the important gypsum companies, eight of the Portland cement companies, and the Portland Cement Association were contacted. The proposal to organize American Ceramic Society divisions for these industries was cordially received in all cases and most of the

companies gave it very careful consideration. Two cement companies and one of the gypsum companies were quite favorably disposed to go forward with the plan, but they thought that it should be deferred until all or most of the companies would participate. It is evident that the majority of the companies are not ready at this date to act, and this Committee feels that it would not be effective to urge action at this time, particularly on account of the fact that the Portland Cement Association is not inclined to approve it.

The Committee feels that the benefits to The Society in the form of increased membership and expanded technical activities and the benefit to the industries in question that would come from contacting the users of their products as well as the stimulus to additional research and development work on their products are all so obvious that the cause is worthy and that we should follow up the project in the future. We believe that, by keeping continually before these two industries the benefits to be derived, the objectives of forming these two new divisions can ultimately be achieved.

II. Status and Activities of the Divisions and Sections

Questionnaires were sent to the officers of all of the Divisions and Sections for the purpose of putting into a permanent record a summary and comparison of their status and activities. Replies were received from five of the Divisions and seven of the Sections. The data are given under the two headings of Divisions and Sections.

(1) Divisions

The five Divisions to submit reports are thriving and doing effective work in almost all respects.

The Art Division is fortunate in having leaders, who are doing splendid work in keeping up interest in this Division and in providing good meetings. The Autumn Meetings of this Division are always the best both as to program and attendance, but there is some need of stimulating more interest and better attendance at the Annual Meetings. It is also recommended that efforts be concentrated on arousing interest in the work of this Division on the part of all the leading American ceramic artists.

The other Divisions have also functioned effectively. The following points are noteworthy. The number of papers presented at the Annual Meeting varied from 17 to 28, the latter figure representing the White Wares Division. Approximately one-half of these papers were scientific or fundamental in character; the others were of the trade-paper or miscellaneous character. The Divisions report a trend to more scientific papers and less of the trade-paper type.

About one-half of the papers presented at the meetings were published; in the Refractories Division, however, practically *all* of the papers of this Division were published. The discussion time varied from 5 to 15 minutes, the latter in the Refractories Division.

Three of the Divisions held symposia. This seems to be a popular feature of the programs and should be encouraged.

Positions are filled by promotion, except in the case of the Refractories Division.

Only the Enamel Division held a special meeting of the officers. We believe that this practice should be encouraged. The average attendance at the Annual Meetings ranged up to 200. The attendance at the special meetings averaged higher, ranging up to 250 for the Art Division. The programs of these special meetings consisted largely of trade papers or of papers of the applied technology class. This is as it should be. With one exception, all of the Divisions favor special or autumn meetings. In this one case, a special situation exists that prevents it, but this Division is not opposed to the practice as a policy for The Society in general.

(B) Local Sections

The six Local Sections that submitted reports vary a good deal in their activities. From two to seven meetings a year are held by the various Sections. The attendance varies from about 20 to 80. Social activities, such as Christmas parties, occupy a prominent place on the program, but the reading and discussion of papers is the more important. Practical or trade papers are the dominant type of paper presented. The annual dues vary from nothing to $2.00 per year. All have dues except one Section. One Section suggests that these dues should be collected by The American Ceramic Society office and that bills be paid from that office. The money is used for postage, mimeographing, and flowers for deceased members. Corporation Members vary in number from one to twelve. Geographical boundaries are only roughly defined and not prescribed in any kind of record.

The Michigan-Northwestern Ohio Section suggests that it be divided into two Sections, but no one has any suggestion regarding a location for an entirely new Section.

One Section suggests that the Local Sections have a special central coordinating agency to handle dues, arrange programs, etc. We think this well worth consideration. Little uniformity exists regarding officers. The heads of some are called presidents, others, chairmen. Some have only three officers, others, as many as five. Officers of The American Ceramic Society have addressed most of these six Sections.

On the whole, the Local Sections seem to be functioning with well-attended programs. The Pacific Coast Sections seem to be the most active. There are possibilities elsewhere of developing Local Section activities much further and of standardizing their organizations and programs. No evidence is available of the need of any new Sections. A special central promotional agency could probably be effective in developing a great deal more interest in these Local Sections.

—M. E. Holmes, *Chairman*,
New York State College of Ceramics, Alfred, N. Y.

COMMITTEE ON PUBLICATIONS

The following is the Report of the Committee on Publications for 1939. Data on publications in *The Bulletin* and the *Journal and Ceramic Abstracts* are included. The Editorial Office with the cooperation of the Committee on Publications has also prepared a proposed style sheet for publications of The American Ceramic Society to be published later in the year.

Report on Ceramic Abstracts for 1939

In 1939, 5201 abstracts and patents were published, making a total of 396 pages including 80 pages of index. There was a slight drop from the number published in 1938 (5290). This decrease is due chiefly to the conditions abroad. Several foreign journals have ceased publication for the duration of the war, and others are condensing two or three issues into one or reprinting articles published in other journals.

About 650 journals are covered regularly by a staff of 70 abstracters. It is interesting to note that the number of journals abstracted has increased from 360 in 1935 to 650 in 1939. German, French, and Canadian patents are now obtained directly by abstracters instead of from other abstract journals.

Comparison of Pages Published 1935–1939

	1935	1936	1937	1938	1939
Journal					
Pages	400	366	404	412	404*
No. of papers	75	64	79	55	62
Abstracts					
No. of pages	369	430	436	450†	396†
Bulletin					
Pages	416	457	504	510†	488†
No. of papers	57	40	51	45	65

* The size of type reduced from 10 on 12 pt. to 9 on 10 pt. (a 20% reduction).

† In September, 1938, *Abstracts* and *Bulletin* Activities type reduced from 8 on 10 pt. to 8 on 8 pt. (a 25% reduction).

ANALYSIS OF PAPERS PUBLISHED IN 1939 ISSUES OF THE *Journal* AND *Bulletin*

(The numerals in parentheses indicate the number of reprints ordered; a plus (+) sign indicates *with* covers; a minus (−) sign, *without* covers. Seven hundred (700) reprints were issued on *Bulletin* reports, activities, and obituaries which have not been counted in the tabular data.)

Presented at Chicago Meeting (1939)	Published (No. of papers) *Journal*	*Bulletin*	Not recd.	Rejected
Functional Sessions				
Orton Lecture		1 (100+)		
Thermal History		3 (700−)	2	2
Silicate Analysis	3 (100+, 100−)		1	
Glaze Symposium	2 (150−)	1	2	1
Divisions				
Art		4 (200−)	2	
Enamel	1	6 (50−)	1	
Glass	6 (950+, 450−)	4 (950−)	8	1
Materials and Equipment	1 (600−)	2 (800−)	6	
Refractories	8 (1000+, 925−)	3 (2000−)	4	2
Structural Clay Products	2 (300+, 250−)	5 (300+, 1050−)	8	2
White Wares	8 (500+, 350−)	2 (100−)	7	1
	31	31	41	9
New Orleans Meeting (1938)				
General (Functional) Sessions	3 (1050+, 100−)			
Divisions				
Art	1 (50−)			
Enamel	11 (2100−)	3		
Glass		2 (800+, 500−)		
Materials and Equipment	1	3 (300−)		
Refractories	8 (400+, 1665−)	1 (300−)		
Structural Clay Products	1 (50+)	3 (1600−)		
White Wares	2 (1000+)	1 (50+)		
	27	13		
New York Meeting (1937)				
General (Functional) Sessions	1 (100−)			
Divisions				
Glass	1			
Refractories	2 (1100−)			
White Wares	1 (550−)			
	5			
Autumn Meetings				
Golden Gate	2	2 (250−)		
Divisions				
Glass (1937)	1 (300−)			
Refractories (1938)		4 (350−)		
White Wares and Materials and Equipment (joint) (1938)		10 (550−)		
Art and Pittsburgh Section		1		
Miscellaneous				
O.C.I.A. Annual (1938)		1 (200−)		
No schedule	2 (100+,50−)	3 (600−)		
	5	21		
Total	**68(5450+; 8840−)**	**65(1250+; 10,500−)**		

EDITOR'S NOTE: 41 papers may come in; 15 papers: no attempt to secure these; 26 papers have definite publication schedule in 1940.

At the suggestion of members of the Editorial Committees, several papers which would have been rejected were revised and approved for publication.

—JOHN D. SULLIVAN, *Chairman*,
Battelle Memorial Institute, Columbus, Ohio

1940 ANNUAL MEETING EXPENSES

Income		
Registration	$3589.50	
Banquet and dance	860.00	
Monday General luncheon	208.00	
Glass Division luncheon	90.00	
Enamel Division luncheon	55.00	
Refractories Division luncheon	65.00	$4867.50
Expenses		
Lettering badges	$ 49.00	
Lettering sign	2.50	
Banquet and dance	856.00	
Canadian Corps	63.00	
Monday General luncheon	207.00	
Glass Division luncheon	90.00	
Refractories Division luncheon	65.00	
Enamel Division luncheon	55.00	
Boys for Meeting room service	186.00	
Local, committee (see Local Committee expenses)	977.26	
Tips, convention porters	8.00	
Rental on lantern	5.00	
Customs broker	18.98	
Editorial breakfast	29.00	
Trustees breakfast	22.00	
Printing luncheon and banquet tickets	7.50	
Bausch & Lomb room	19.80	
Office staff traveling and hotel expenses	370.90	
Editorial room (telephone)	6.48	
Luncheons, Chamber of Commerce girls	8.00	
Student reception	82.00	
Desk set	1.65	
Syracuse exhibit	210.56	
Long-distance calls	33.90	
Preprints	76.40	
Badges	66.44	
Andrews' letter requesting papers	18.20	
Telegrams	179.88	
Printing registration cards	28.15	
Publicity cards	23.69	
Postage	49.49	
Printing programs	629.23	
Stenotype reporting	222.00	$4667.71
		$ 199.79

Registration Attendance

676 men at $5.00
81 students at $1.50
88 ladies at $1.00

845
31 Service

876

Local Committee Expenses

Sunday		
Afternoon reception	$ 60.20	
Gratuities	6.00	
Evening entertainment	50.00	
Monday		
Noon entertainment	50.00	
Gratuities	20.00	
3 complimentary tickets	3.00	
Night entertainment	425.00	
Stage help, spotlight, etc.	25.00	
Tuesday		
Ladies' tea gratuities	2.00	
Bus	6.00	
Tuesday night drinks	231.00	
Evening entertainment	150.00	
Pigs, whistles, etc.,	15.43	
Gratuities	23.00	
Wednesday		
Ladies' luncheon	66.75	
Tips to bus drivers	3.00	
Buses	76.00	
General		
Help at Meeting	12.00	
Meals for help	3.50	
Tips and telephone	5.03	
Sundries	6.20	
Printing		
Ladies' Tuesday tea	1.62	
Ladies' Wednesday trip	2.70	
Ladies' Sunday welcome	1.62	
Ladies' greeting cards	3.28	
Badges, Local Committee	2.48	
Badges, Pins	0.20	
Monday lunch tickets	4.86	
Tuesday night tickets (numbered)	7.02	
Tuesday night tickets (cancelled)	2.50	
Large Convention cards	4.50	
Stationery, letterheads, and envelopes	7.17	
Tuesday night special cards	2.43	
Postage		
Chairman	2.00	
Secretary's Office	11.27	$1292.76

Receipts

Tuesday night tickets	$ 239.50	
Wednesday drive (ladies)	76.00	
Balance	977.26	$1292.76

FORTY-THIRD ANNUAL MEETING, AMERICAN CERAMIC SOCIETY

BALTIMORE, MARYLAND, MARCH 30 to APRIL 5, 1941

Headquarters and Meetings in Lord Baltimore Hotel with Guaranteed Rooms Available in Hotels Emerson, Southern, Maryland, New Howard, and Belvedere

REPORT BY DEAN OF FELLOWS

The Fellowship year has been one of less activity than former years have shown. Certain specific functions connected with the affairs of the general Society are now performed by this body, but the impression seems to be gaining ground that we represent merely an honorary status and that, as a class of The Society, we do not need to initiate new enterprises. It must occur to all of us that the Fellowship is still relatively young and that after all we might better proceed slowly in the assumption of new duties and in the attempt to seek further and unnecessary justification for our existence.

S. R. Scholes, Secretary of the Glass Division since 1933 and Past Dean of the Fellows for 1939–1940

During the year, only ten names have been presented as nominees. The Fellowship Board has performed faithfully and promptly and has elected nine of these men. The Trustees have ratified these elections. While we do not wish to place ourselves in the position of soliciting new members, we ought, in my opinion, to have a larger group of candidates. From at least one source I have received a letter expressing disparagement of the Fellowship grade on the part of a prospective nominee. Surely, if any criticism can be aimed at our selection in past years, it is that we have rejected too many candidates rather than that we have let down the bars and made admission too easy. Nevertheless, activity in presenting names is by no means equally distributed among the several Divisions of The Society. It may be that this is the result of the Dean's failure to canvass the officials of the several Divisions sufficiently early in the Fellowship year and to encourage them to scan their rosters for men whose years of service and records of achievement have now qualified them for elevation. This matter is one that is bound to show variation from year to year according to the status of Division chairmen and their attitude concerning the Fellowship.

Edward Schramm, Dean of the Fellows, 1940–1941

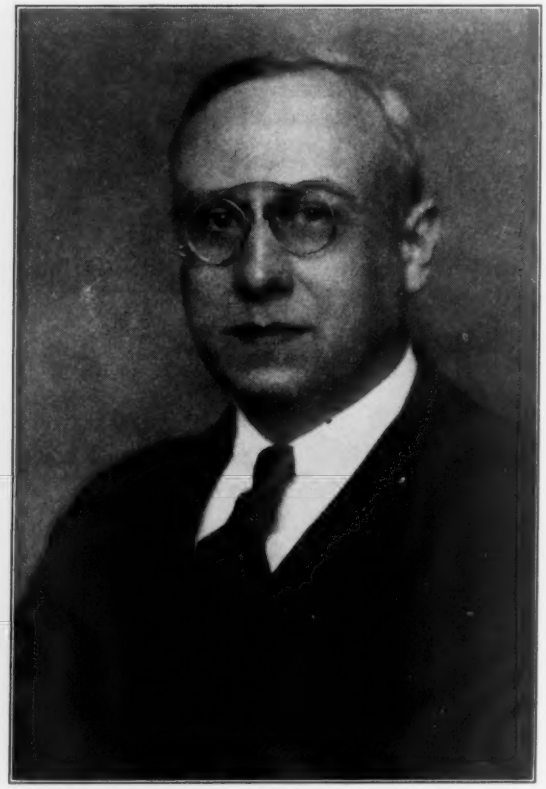
A committee was named to select, from members of The Society resident abroad, some outstanding names. Owing to the situation arising from the state of war in Europe, however, it seemed best to defer these nominations until more peaceful times, when selections could be made without any show of prejudice.

Our nominating committees selected their slates of candidates promptly and obtained assurance from the nominees that they would serve if elected.

I wish to repeat the recommendation made by Dean Cox last year that action be taken to reduce the size of the nominating committees. Surely three men can do as well as five in selecting the candidates, and there would be a corresponding reduction in the burden of correspondence laid upon the Chairman.

—S. R. SCHOLES, *Dean*,
N. Y. State College of Ceramics, Alfred, N. Y.

GROW BY GETTING
MORE NEW MEMBERS
TO JOIN THE
SOCIETY



T. A. Klinefelter, Associate Dean of Fellows, 1940–1941

A. H. M. ANDREASEN ELECTED HONORARY MEMBER OF SOCIETY

The Committee on Honorary Membership of the Fellows and the Board of Trustees of The American Ceramic Society elected Professor A. H. M. Andreasen to the only Honorary Membership in this Society for 1939–1940.

Albert H. M. Andreasen was born on June 1, 1896, at Kalundborg, Denmark, where his father was a municipal officer. He attended Danish schools and passed his university matriculation examinations with high honors. In 1918, he received the degree of Master of Science in Chemical Engineering at the Danish Technical University. In 1929, he was awarded the degree of Doctor of Science by the same institution, his dissertation being on the subject of theoretical and experimental investigations of ground materials (see (7) in Bibliography).

After a year in the Danish army school for officers, young Andreasen took up his academic positions at the Danish Technical University, at Copenhagen, Denmark. From 1919 to 1928, he held the posts of technical assistant and assistant professor in applied chemistry. He also maintained an interest in practical problems by acting as consulting chemist to firms in Denmark and Sweden.

Since 1928, he has held the Professorship of Applied Chemistry at the Danish Technical University, as well as the Directorship of the Department devoted to Mortar, Glass, and Ceramics.

Andreasen was made a member of the Danish Society of Science in 1929 and a Fellow of the Danish Academy of Applied Science in 1937. He maintains membership in The American Ceramic Society, the British Ceramic Society, the Society of Glass Technology, Deutsche Keramische Gesellschaft, Glastechnische Gesellschaft, and Kolloid-Gesellschaft.

Professor Andreasen is held in high esteem in his native country, having been made a member of the Danish Patent Court in 1934 and honored with the Danish Order of Knighthood in 1937. He has traveled quite extensively in Europe and in the United States and is well known in chemical and ceramic circles, having attended and participated in a number of international conventions and technical society meetings.

He has specialized in the field of fine particles, covering such ramifications as the production of fine particles; their separation by screens, sedimentation, and air buoyancy; and the determination of particle size of many finely divided products by several methods. The chemistry of colloids, particularly pertaining to inorganic and mineral substances, has received his earnest attention. The pipette bearing his name is an example of a practical apparatus intended to measure particle size by sedimentation according to Stokes' Law.

Publications

(1) "Einige Betrachtungen und Beobachtungen über die Wirkungsweise des Schüttelsiebes," *Sprechsaal*, **60,** 515 (1927); 18 pp.

(2) "Eine selbstregistrierende Sedimentationswage, die Sedimentationskurve direkt aufzeichnet," *ibid.*, **60,** 869 (1927); 8 pp.

(3) "Fundamentals of Colloid Chemistry with Emphasis on Technical Applications," *Danske Kemiske*, No. 1; *Kemisk*, **8** [2], [3], and [4] (1927); 54 pp. (in Danish).

(4) "Einige Untersuchungen über die Siebung begleitende Abnutzung des Siebgutes," *Sprechsaal*, **61,** 299 (1928); 4 pp.

(5) "New Apparatus Used in Factory Control of Fineness of Ground Products," *Kemisk*, **9** [2] (1928); 6 pp. (in Danish).

(6) "Reactions in the Solid Phase," *Kemisk*, **9,** 101 (1928); 19 pp. (in Danish).

(7) "Zur Kenntnis des Mahlgutes; theoretische und experimentelle Untersuchungen über die Verteilung der Stoffmenge auf die verschiedenen Korngrössen in zerkleinerten Produkten," *Kolloidchem. Beihefte*, **27,** 349 (1928); 110 pp.

(8) "A Contribution to Particle-Size Analysis of Coarse Materials," *Rept. of 18th Scandinavian Naturalist Congress*, Copenhagen, August 26–31, 1929; 1 page (in Danish).

(9) "Über die Gültigkeit des Stokes'schen Gesetzes für nicht kugelförmige Teilschen," *Kolloid-Z.*, **48,** 175 (1929); 9 pp.

(10) (With J. J. V. Lundberg) "Über Schlämmgeschwindigkeit und Korngrösse," *ibid.*, **49,** 48 (1929); 12 pp.

(11) (With J. J. V. Lundberg), "Ein Apparat für die Dispersoidanalyse und Einige Untersuchungen damit," *ibid.*, **49,** 253 (1929); 33 pp.

(12) (With J. Andersen) "Über die Beziehung zwischen Kornabstufung und Zwischenraum in Produkten aus losen Körnern (mit einigen Experimenten)," *ibid.*, **50,** 217 (1930); 32 pp.

(13) "Progress in Investigation of Fineness of Several Ground Materials," *Kemisk*, **10** [10] (1929); 4 pp. (in Danish).

(14) (With J. J. V. Lundberg), "Ein Apparat zur Feinheitsbestimmung nach der Pipette-methode mit besonderem Hinblick auf Betriebsuntersuchungen," *Ber. deut. keram. Ges.*, **11,** 249 (1930); 14 pp.

(15) "Determination of Fineness of Cements," *Kemisk*, **11** [1] (1930); 1 page (in Danish).

(16) (With J. J. V. Lundberg), "On the Grinding Capacity of Flint-Ball Mills," *Trans. Ceram. Soc.* [England], **29,** 239–50 (1930).

(17) (With J. J. V. Lundberg), "Apparat zur betriebsmässigen Feinheitsbestimmung der Mörtelstoffe und über einige damit ausgeführte Untersuchungen," *Zement*, **19,** 698 (1930); 19 pp.

(18) "On the Fineness of Solid Substances," *Dansk Tids. Farm.*, 261 (1930); 20 pp. (in Danish).

(19) "Über die Feinheitsbestimmung und ihre Bedeutung für die keramische Industrie," *Ber. deut. keram. Ges.*, **11** [12] 675–87 (1930); 13 pp.

(20) "Untersuchungen über die Bestimmung der Grösse

von losen Körnern," *Mitt. neuen internat. Verbandes materialprüfungen*, Gruppe D, 156 (1930); 5 pp.

(21) "Einige Beiträge zur Erörterung der Feinheitsanalyse und ihrer Resultate," *Arch. Pflanzenbau*, **6,** 230 (1931); 30 pp.

(22) Über die Feinheitsbestimmung nach der Pipettemethode mit Andreasens Apparat" (brochure), H. Struers Chem. Lab., Skindergade 38, Copenhagen; 4 pp.

(23) "Theoretisches und Experimentelles über Korngrösse und Feinheit," *Assoc. intern. essai matériaux, Congr. Zurich*, September, 1931; 6 pp.

(24) "Laws of Fine Grinding," *Crushing and Grinding*, **1,** 69 (1931); 2 pp.

(25) "Contribution to the Particle-Size Determination of Technical Materials," *Tek. Tid.*, Nos. 37 and 41 (1931) and Nos. 2, 7, and 11 (1932); 45 pp. (in Danish).

(26) "Variables in Sampling Bulk Loose Particles," *Kemisk*, **14,** 49 (1933); 8 pp. (in Danish).

(27) (With S. Berg), "Beispiele der Verwendung der Pipette-methode bei der Feinheitsanalyse unter besonderer Berücksichtigung der Feinheitsuntersuchung von Mineralfarben," *Beihefte Z. Ver. deut. Chem., Angewandte Chemie und Chemische Fabrik*, No. 14; 28 pp.; abstracted in *Angew. Chem.*, **48,** 283 (1935); 5 pp.

(28) (With B. Wesenberg and E. G. Jespersen), "Zur Kenntnis des Zerkleinerungsvorganges," *Kolloid-Z.*, **78,** 148 (1937); 18 pp.

(29) Mortar, Glass, and Ceramic Industries, and Their Products, 36 pp. Kemisk-Teknisk Haandbog, Copenhagen, 1938; (in Danish).

(30) (With S. Berg and E. Kjaer) "Einige Kolloidversuche mit einer Kugelmühle," *Kolloid-Z.*, **82,** 37 (1938); 12 pp.

(31) "Die kolloiden Anteile des Mahlgutes," *Ber. deut. keram. Ges.*, **19,** 23 (1938); 10 pp.

Nos. 1, 2, 4, 7, 12, and 16 are to be found in the Danish literature also; No. 7 appears in an English abstract.

The papers appear in the language of their titles, unless otherwise specified.

THE INSTITUTE OF CERAMIC ENGINEERS

Executive Committee

President: H. G. WOLFRAM, Porcelain Enamel & Mfg. Co., Baltimore, Md.

Vice-President: E. H. FRITZ, Westinghouse Electric & Mfg. Co., Derry, Pa.

Secretary: H. M. KRANER, Bethlehem Steel Co., Bethlehem, Pa.

Past-President: J. L. CARRUTHERS, Ohio State Univ., Columbus, Ohio.

Trustee Representative: R. E. BIRCH, Harbison-Walker Refractories Co., Pittsburgh, Pa.

REPORT OF THE PRESIDENT

Introduction

This meeting marks the close of the second year of the Institute of Ceramic Engineers. The year past was not marked by any outstanding achievements but rather has been a period of solidifying the organization, correcting certain weaknesses in its procedures, and extending its activities.

This organization is somewhat unique because its principal purposes, viz., promotion of the welfare of the profession, education for the profession, and development of the young engineer in the profession, are quite often considered only as secondary activities by other engineering societies. Therefore, it seems that our affiliation with The American Ceramic Society allows us as ceramic engineers to participate in the exchange of technical and scientific ceramic information and to promote our own purposes without duplication of effort and time at only slight additional expense. If we keep in mind the purposes of the Institute and of The Society, it is believed that the development and accomplishments of the Institute in the past two years have more than justified the forming of this organization.

It is my purpose (1) to inform you of the status of the organization at this time, (2) to review briefly the activities and accomplishments of the Institute during the past year, and (3) to make certain recommendations based on experience in the office of the President.

Present Status (Membership)

During the past year, your Membership and Examinations Committee recommended to the Executive Committee that 35 applicants be elected to membership in the Institute. They also recommended that several applicants be not elected to membership since they did not appear to meet the requirements of any of the member grades of the Institute.

In several cases, the Executive Committee elected applicants to Associate Member Grade instead of Member Grade as recommended. This action was taken to keep election to Member Grade consistent with qualifications presented by a number of applicants. The Executive Committee also referred the name of one nonrecommended applicant back to the Membership Committee for reconsideration. The Committee later recommended the applicant for election. This action was taken by the Executive Committee because it was believed that important qualifications of the applicant had not been recognized owing to the meager data in the application blank. It so happened that the applicant's qualifications were known to some members of the Executive Committee.

At this meeting, the Institute is voting on amendments to the Rules concerning certain requirements for membership. It is believed that such amendments together with a new procedure adopted for the examination of the records of applicants for Member Grade will simplify the election of properly qualified applicants and the advancement of qualified Associate Members to Member Grade.

Your Executive Committee has also approved a procedure for handling the advancement of Junior Members to Associate Members as provided by the Rules.

These actions should remove many difficulties that have been encountered during the past two years in dealing with membership questions. Incidentally, the high membership standards of the Institute will be more easily and equitably maintained.

The Institute now has the following membership for 1940:

Members	178
Associate Members	77
Junior Members	31
Resignations and deaths	−6
Total	280

Finances

In the 1939 budget of The American Ceramic Society, the sum of $100 was allocated for the use of the Institute if needed. This $100 was not used because the receipts of the Institute exceeded its disbursements and hence the money reverted to The Society. A grant of money from The Society was not requested for the year 1940 because the anticipated income from 1940 assessments would allow the Institute to continue its projected activities without impairment of the resources accumulated in the preceding years. The budget of the Institute for 1940 was published in the April, 1940, issue of *The Bulletin* (page 155).

Activities

The reports of the standing committees of the Institute will give you the details of their work in their respective

fields. There are, however, certain other activities which should be noted at this time.

(1) The Institute has cooperated with the Industrial Minerals Division of the American Institute of Mining and Metallurgical Engineers at its fall meeting (November, 1939) at Tuscaloosa, Alabama. T. N. McVay served as the representative of the Institute in the promotion of a very successful meeting.

The Institute has again agreed to cooperate in holding a similar meeting on November 14 to 16, 1940 (tentative date), at Urbana, Ill. C. W. Parmelee has been appointed as the Institute's representative for that meeting.

(2) Your President attended the annual meeting of the A.I.M.M.E., February 11 to 13, in New York City. Contacts were made with the Educational and the Industrial Minerals Divisions of the A.I.M.M.E. At the education meeting, a paper on "Ceramics for Nonceramic Engineering Students" (written by A. F. Greaves-Walker) was read. Both of these divisions are interested in cooperating on mutual problems.

(3) During the year, your Executive Committee voted to make application for membership in the Society for Promotion of Engineering Education. Formal application has been made, supported by literature on the profession of ceramic engineering and the Rules of the Institute, to the Institutional Membership Committee of S.P.E.E. Other engineering organizations, such as the American Society of Civil Engineers and American Institute of Chemical Engineers, are members of S.P.E.E.

The cost of membership will be $15.00 per year. Each Institutional Member receives two copies of the *Journal of Engineering Education*. It has been proposed that one copy should go to the Chairman of our Education Committee and the other to the Editor of our page in *The Bulletin*. This second copy is later to be filed in the library of The American Ceramic Society. It has also been proposed that the Chairman of the Education Committee should be the representative of the Institute to S.P.E.E. meetings.

(4) The Society for the Promotion of Engineering Education also publishes a pamphlet, "Engineering, a Career and a Culture," which is widely distributed to high-school students seeking vocational guidance. The present edition is about exhausted and will probably soon be reprinted in the revised form. The Chairman and Secretary of the S.P.E.E. Committee have advised the Institute, upon our application, that they will make provision for a section dealing with ceramic engineering.

Incidentally, along the same line, your attention is called to the monograph, "Ceramic Engineering as a Career," published by the Institute for Research, Chicago, Illinois. This pamphlet should be in the library of every high school in ceramic industrial areas.

(5) Christian W. Planje of Lincoln, Calif., was appointed as the Institute's representative to the meeting of the National Council of State Boards of Engineering Examiners held in San Francisco. At the last minute, Mr. Planje was unable to attend, hence our only contact with that organization has been by correspondence. The Institute should be represented at this year's meeting by the Chairman of our Committee on State Boards.

(6) S. J. McDowell attended the annual meeting of the National Engineering Council and is reporting on same at this meeting (this issue, p. 229).

Acknowledgments

(*a*) You are probably aware of the Institute page appearing monthly in *The Bulletin* of The Society. The credit for assembling and writing this material goes to Raymond E. Birch, who voluntarily is continually reviewing engineering activities in general and passing along material of special interest to our organization. The Institute can make good use of this page (or pages if necessary) in promoting our purposes and business. All members are earnestly requested to send pertinent material to Mr. Birch.

The cooperation of Ross C. Purdy as Editor of The Society publications has also contributed to this enterprise.

(*b*) Your President hereby expresses his appreciation of the cooperation of the staff at the office of The American Ceramic Society in the work of the Institute. They have rendered a number of services, such as mimeographing and mailing questionnaires, ballots, and proposed changes in Rules; keeping our files up-to-date; mailing our supplies; keeping careful record of and handling our financial transactions. All of this work has been done readily, willingly, and in fine style.

(*c*) Your President also expresses his appreciation of the work done by the various committees of the Institute. The work of the Membership and Examinations Committee (A. S. Watts, *Chairman*) and of the Education Committee (E. H. Fritz, *Chairman*) has been exceedingly difficult during the past year, and they are to be especially commended for the way in which it has been handled.

Recommendations

The following recommendations are presented for your consideration with the belief that they will help promote the welfare and purposes of this organization.

(*a*) *Papers for Our Program:* During the several years in which the Institute has operated, our meetings have been devoted to organization problems. It is believed that we should now plan for a short program of papers at each meeting. These papers must deal with the purposes of the Institute as indicated in Article EIR-V (Sec. 3) of our Rules.

I would therefore recommend the appointment of a program chairman for each annual meeting, who would arrange for not more than three papers.

(*b*) Your attention is called to the few sales of Institute badges to our members. Perhaps our members are not badge-wearers, yet members of other engineering groups quite generally wear their badges as a mark of recognition. It is believed that the membership standards of the Institute are so high that we also can wear it as a badge of recognition and attainment. This Institute needs additional recognition from other groups, and wearing a badge is a step in that direction. The idea is again presented for your consideration.

(*c*) Copies of the monthly *Bulletin of the American Engineering Council* are available at this meeting. These copies may be obtained by the Institute for their members at one cent each plus postage. The principal problem is one of distributing the *Bulletin* to the members. It is believed that the *Bulletin* is of real value to our members and that therefore we should devise a scheme for distributing it to our members if they also believe it is of value to them.

Therefore, it is recommended that either the Executive Committee or a special committee, to be appointed by the new President, should undertake the development of a method of distribution that will be within the financial limitations of the Institute.

Conclusion

The future of this organization will depend primarily upon the service that it renders to its members and the industry. It is believed that our greatest service can be rendered in the education of ceramic engineers both in the fields of undergraduate instruction and post-college aid to the young graduates. Therefore, we should look to our Committee on Ceramic Engineering Education and our Committee on Professional Status and Development for our material contributions to the profession of Ceramic Engineering.

We also need the backing of every qualified ceramic engineer in our work. If we know of such engineers in the industry who are not members of The Society, and hence ineligible for membership in the Institute, we should sell them on the idea of joining both The Society and the Institute. They should join, not just to be a member but to be able to keep pace professionally with other ceramic engineers. Membership should be part of their engineering education program which lasts for life.

To date, we have not sought members, but now with our new Membership Rules we should go forth and endeavor to

interest all qualified engineers in the Institute. Our grades of membership should be a challenge to them to qualify on the basis of professional accomplishment.

In closing, I wish to express my thanks to the members of the Institute for the opportunity of being of some service in the promotion of the purposes of the Institute of Ceramic Engineers. —J. L. CARRUTHERS, *President*,
Ohio State University, Columbus, Ohio

REPORT OF THE SECRETARY

The balance in our Treasury, as reported by The American Ceramic Society, as of April 1, 1940, was $533.13. There were, at that time, delinquent dues amounting to the sum of $126.00.

On January 11 and 12, your Secretary, representing the Institute of Ceramic Engineers, attended the meeting of the Engineering Societies Secretaries and of the American Engineering Council at the Mayflower Hotel in Washington, D. C., and found both meetings interesting, although some of the questions discussed did not apply directly to our organization.

The Secretaries Meeting took up the many phases of engineering work. Probably the high spot was a talk by A. R. Cullimore, President of the Newark College of Engineering, on "Method of Arousing a Satisfactory Discussion of Given Problems in Engineering Meetings." He touched on the advisability of having the speaker not talk down to the meeting or of stating controversial subjects as facts, and, if possible, to have the questions involved delivered as impersonal matters so that all would take part in the discussions and no one would find it necessary to defend his position. These methods have been tried on his students and faculty members with considerable success. This was not the topic listed in the program and he, as well as other speakers, wandered afield of their program subjects in an interesting manner.

In the discussion of legal registration of professional engineers, your Secretary had an opportunity to voice the dissatisfaction of the ceramic engineers in some states where they have to pass an examination on construction or some other phase of engineering, such as chemical engineering, about which they know little. His remarks followed similar objections from the representatives of the radio and marine engineers to the New York State registration law.

Friday's session of the American Engineering Council covered extensive reports of committee work, with talks by various men in responsible government positions. Some of the more important subjects discussed were as follows:

(1) Survey of the Work of Engineers and Engineering Societies in Public Affairs.

(2) The Engineer as a Labor Mediator or Arbitrator.

(3) The Engineering Educational Relationship with Central and South Americas; (*a*) there is already a treaty in effect by which an exchange of professorships will be made with Latin American universities and some of these will be engineering professors, and (*b*) there is also a movement being started to have private manufacturers, as well as highway departments, employ during the summer vacations those engineering students in our universities from Latin America who desire such employment; these movements are, of course, all part of a program to promote good will and better understanding between ourselves and our American neighbors to the south.

(4) Patents and a discussion of the Proposed Law Change in Patent Law. This was lead by the Commissioner of Patents.

(5) The Relation of Engineers to Public Low-Cost Housing.

It seemed that the most valuable thing to be derived from these presentations is the enlightening realization that so much is being done by individuals and engineering groups for the public welfare in a variety of fields outside the small ones with which one is usually familiar. It was all a most refreshing and interesting insight into this phase of our somewhat prosaic profession.

The Executive Secretary of the American Engineering Council, Frederick M. Feiker, has resigned to accept a position as dean of an engineering school, and his successor had not been named. Alonzo J. Hammond was elected President for the next two years.

—S. J. MCDOWELL, *Secretary*,
General Ceramic Company, Keasbey, N. J.

COMMITTEE ON PROFESSIONAL STATUS AND DEVELOPMENT

The duties of the Committee and its previous work are well stated in the report of the Committee presented at the 1939 meeting. In this report, there are several suggestions for the future work of this Committee. These suggestions have been used as a basis for the work this year.

Improving Professional Status of Ceramic Engineers

The Committee continued efforts to have recognition of ceramic engineering by the E.C.P.D. as an individual branch of engineering. Through the efforts of A. F. Greaves-Walker and others, ceramic engineering is now recognized with mining, metallurgy, petroleum, and geological engineering as one of the group of Mineral Industries Engineering by the Society for the Promotion of Engineering Education.

The Committee was asked for an explanatory statement of ceramic engineering by Dean Sackett, who is preparing a revision of the pamphlet, "Engineering as a Career," for the E.C.P.D. The committee asked for equivalent space and recognition in this pamphlet as was given to other branches of engineering. This was not granted. Members of our Institute should use any influence they have on the E.C.P.D. for this equal recognition. The Institute of Ceramic Engineers should continue to strive to be accepted as a participating body of the E.C.P.D. Dean Sackett assured the Committee that he would use his influence for this acceptance.

Through the efforts of several members of the Institute, the state boards of additional states have recognized ceramic engineering, and at the present time there are fourteen states that grant licenses to ceramic engineers. This Committee and all members of the Institute should assist in obtaining recognition in the remainder of the states.

A pamphlet has been prepared for use by high-school students, teachers, and others who counsel young men in the choice of their vocation. This pamphlet explains the scope of the field of ceramic engineering; briefly describes the Institute of Ceramic Engineers, The American Ceramic Society, etc.; presents a bibliography that should help them in selecting their career in engineering; and gives them other information so that the type of young man desired will be encouraged to study ceramic engineering. It is planned to publish this in a form so that it may be sent out to high schools, preparatory schools, etc.

Most of the program followed by this Committee is a continuation of that set up by the previous committee, and it is suggested that this should be continued in the future and that all members of the Institute continue giving their assistance to this work.

—J. W. WHITTEMORE, *Chairman*,
Virginia Polytechnic Institute, Blacksburg, Va.

COMMITTEE ON STATE BOARDS OF ENGINEERING EXAMINERS

During the past year, the efforts of the Committee have been directed toward securing recognition of ceramic engineers in the states of Pennsylvania, Maryland, New Jersey, and Virginia and in the District of Columbia.

We have been successful in Pennsylvania, where the State Board of Engineering Examiners agreed to grant professional licenses to qualified ceramic engineers. The matter is still before the boards in the other states.

Through the efforts of the Committee and with the assistance of the American Engineering Council, ceramic engineers were included in the licensing bill for the District of Columbia at the last session of Congress. The

bill passed the Senate, but Congress adjourned before the House took action.

It was considered important that ceramic engineers be included in this bill as it would no doubt influence state boards having the question of recognition under consideration.

A licensing bill in which ceramic engineers were included was presented at the last session of the Missouri legislature but failed to pass.

The following states now license ceramic engineers: Alabama, Arizona, Connecticut, Florida, Georgia, Iowa, Kentucky, New York, North Carolina, Ohio, Oregon, Pennsylvania, Tennessee, and Wisconsin.

Members of the Institute can be extremely helpful in the matter of gaining recognition in those states which do not grant licenses to ceramic engineers by applying for a license. If the application is refused or questioned, the officers and committees of the Institute can then bring the necessary pressure to bear on the members of the state board with considerable chance of success. This was the case in Pennsylvania. In the majority of the states in which recognition has not been granted, the excuse of the state boards has been that they have never received an application from a ceramic engineer and until they do there is no reason to act.

It appears particularly important to the membership of the Institute that ceramic engineers should be recognized in New Jersey, Maryland, West Virginia, Kentucky, and Indiana, and members living in those states, who have had considerable experience, are urged to apply for professional licenses.

—A. F. GREAVES-WALKER, *Chairman*,
University of North Carolina, Raleigh, N. C.

COMMITTEE ON CERAMIC ENGINEERING EDUCATION

The Committee on Ceramic Engineering Education, at the 1939 meeting of the Institute in Chicago, reported on a survey that it had made of the training and fitness of recent ceramic engineering graduates by means of questionnaires which had been sent to the employers of these graduates. The response to these questionnaires was so satisfactory that the Committee decided to go further with the questionnaire idea and submit one to the entire membership of the Institute to obtain the reactions of these ceramic engineers, many of whom have had considerable experience in the industry, as to the value of their own education in their work and their opinions as to what should be included in the present ceramic engineering courses. This progam was carried out during the year.

Questionnaire

Questionnaires were sent out to 251 persons; 133 replies were received. Because this is slightly more than one-half, it was considered to be a very satisfactory response. It was particularly gratifying to note that complete information was given in practically all cases and that so many of the replies indicated careful thought and an analysis of the subject. The Committee feels that considerable information has been obtained as to possible improvements in present ceramic engineering curricula and that our Ceramic Educators can, with profit, study these questionnaires in detail. The fact that replies were received from men in all branches of the ceramic industry adds to their value because they broadly represent the experiences and needs of the entire ceramic industry.

The individual questions together with a brief summary of the replies to each follow herewith:

(*1*) *In what branch of ceramics have you spent the major part of your time since graduation?*

Replies to question (1) showed that all branches of ceramics were represented: refractories, 30; whiteware, 27; educators and research, 24; heavy clays, 19; enamels, 9; materials and equipment, 8; abrasives, 6; glass, 6; terra cotta, 4. Aside from being low in enamels and glass, this representation is probably not far from the actual division of the engineers among the various branches of activity.

(*2*) *Do you wish that you had had more fundamental courses or more specialized courses while in school?* By fundamental courses, in addition to the fundamental sciences of mathematics, physics, and chemistry, we mean courses dealing specifically with principles, such as combustion, pyrometry, heat-treatment effects, etc. By specialized courses, we mean courses dealing with specific products or manufacturing processes, such as whiteware, glass, heavy clay products, refractories, enameling, etc.

This question showed that a vast majority (80%) favored more fundamental courses. This agrees quite closely with the replies to a similar question in last year's questionnaire. In that case, 75% of the replies showed a preference for fundamental courses. This seems to show that more work in the fundamentals might well be considered, even at the expense of some of the specialized courses.

(*3*) *What fundamental courses have been of most relative value to you?* Indicate by numeral your preference as to order of importance; (*a*) mathematics, (*b*) physics, (*c*) chemistry, and (*d*) others.

The replies definitely gave first choice to chemistry, since 60% of the replies so designated. The remainder showed a slight preference for physics, with mathematics and other fundamental courses following in that order, but there was not sufficient difference between these three to be of any importance. Under other courses, geology was repeatedly mentioned and there is some justification, therefore, to consider it as a fundamental science of almost equal importance to physics and mathematics. In last year's questionnaire, the same order of preference was shown, but the preference for chemistry was not nearly so marked.

(*4*) *What specialized courses have been of most value to you?*

The replies to a large extent indicated a natural tendency to favor those specialized courses which were directly related to the work in which the individual was engaged. The refractories men in most cases designated refractory courses, the whiteware men mentioned whiteware and courses in bodies and glazes, and similarly with the other industries represented. A considerable number of other courses were named, and if every one included in the 133 replies were listed, it would probably come close to being a list of practically all of the specialized courses that are offered. Considering, however, only those that were mentioned in at least 10% of the replies, in addition to those courses directly related to the various industries, we find that *kilns and firing* were designated in approximately 20% of the replies, *mineralogy* in 15%, *drying* in 10%, *ceramic design* in 10%, and *petrography* in 10%. These therefore may be considered as the more important specialized courses other than those that specifically relate to ceramic products.

(*5*) *What course or group of courses have you had little or no use for?*

The answers to this question to some extent were influenced again by the particular work in which the man was engaged, but the course in which there was the most agreement as having been of little or no use was calculus, or higher mathematics in general, approximately 25% so indicating. Beyond that, a large number of courses were shown and among these, foreign language was mentioned in 10% of the replies, ceramic design in 10%, and surveying in 8%. The others were not mentioned often enough to be of any significance. It is interesting to note that 25% of the replies indicated that all of the courses had been of value. It would seem from this that calculus is about the only course that could be considered for de-emphasis.

(*6*) *Do you feel that the emphasis placed by the schools on laboratory work and processing technique is warranted?*

The vast majority replied to this question in the affirmative, more than 80% favoring the emphasis placed by the schools on this work. Those opposed, in many cases, qualified their objection by mentioning their opposition to processing technique only, as they felt this could be obtained through actual experience in the plants. The

importance of laboratory work in the courses, therefore, seems to be unquestioned.

(7) *Is there sufficient time given in the curricula to (a) design courses, (b) mechanical and electrical engineering courses, and (c) other specific engineering subjects?*

In regard to (*a*) design courses, the replies were strongly in the affirmative, approximately 75% making that indication. The men from the heavy clay industry, however, voted 9 for to 7 against on this question. With (*b*) mechanical and electrical engineering courses, the situation was considerably different, with a majority (approximately 55%) indicating that sufficient time had not been given to mechanical and electrical engineering. Of those answering (*c*), a considerable number specifically mentioned electrical engineering; it would seem, therefore, that electrical engineering in particular should be given more attention. As far as other specific engineering subjects are concerned, the replies were so varied and brought out so many different ideas that no particular trend could be developed from them.

(8) *Do you think that the method of presentation, particularly of lecture courses, is satisfactory, considering the arrangement of the subject matter and the ability of the student to absorb the information as it is presented?*

The answers to this question showed that approximately 45% felt that the method of presentation was satisfactory; approximately 35% did not. The remaining 20%, and some of the 80% who made a definite choice, qualified their answers with recommendations for mimeographed lectures rather than dictated lectures and also, in a number of cases, by a statement that the method of presentation depends on the lecturer. Taking into account that 35% answered "no" and that 30% had specific recommendations for improvement, the method of presenting lecture courses might well be given some study.

(9) *Should there be a treatment of business organization and the cost aspects of engineering in school?*

There was a preponderance of opinion in favor of including this work in the courses, with approximately 90% answering affirmatively. Some of those favoring, however, amplified their reply further, which indicated that this work would be desirable but is of minor importance as compared to the more fundamental courses. It would seem, therefore, that a course of this kind is warranted but that it should not be included at the expense of the more fundamental courses.

(10) *Should there be a course given in practical English, speech, and report writing?* If so, what is the order of preference of these subjects, such as (*a*) practical English, (*b*) speech, and (*c*) report writing?

In this case, the opinion was practically unanimous in the affirmative, there being only 5 negative replies. There was no particular preference shown in these subjects, and the answers, therefore, indicate that all three are of equal importance. The almost 100% agreement, however, as to the necessity of a course of this kind is significant, particularly when we find that the same opinion was voiced by the employers in last year's questionnaire. It would seem to indicate that, although English courses are probably included in all ceramic engineering curricula, the needs of the graduates are not as yet satisfactorily taken care of and that these courses might well be given some study, not necessarily for the purpose of increasing the amount of work but rather from the standpoint of making them more effective in developing better ability in expression both in written and spoken form.

(11) *Do you care to make suggestions for the improvement of ceramic engineering training?*

As in the case of last year's questionnaire, question (11) resulted in a large variety of suggestions for the improvement of ceramic engineering training. Actually, there were 231 individual comments and suggestions made, or an average of almost two for each reply. A careful review of these indicates that certain leading thoughts were emphasized which may be summarized as follows:

(*a*) Increased emphasis on fundamentals is mentioned more frequently than any other item, and those who made this suggestion in many cases indicated that this should be done, even at the expense of specialized courses. Others who recognized the value of specialized courses often suggested a five-year course in order to accomplish this. This reaction naturally follows from the replies to question (2). Inasmuch as there is considerable argument against a five-year course, any rearrangement of the present four-year course, which would permit more work on fundamentals without decreasing the number of specialized courses, would be the ideal solution to this situation. The following specific comment is quoted from one of the replies as an example of this particular suggestion:

"If I were going to school again, no specialized course would even be considered. A thorough general engineering course, based on fundamentals, with a small amount of law, English, and business administration would be taken for the first four years; then specialization could follow if desired. It is impossible to make any specialized engineer in four years. Most present-day graduates are sadly lacking in fundamentals. Most college men, while in school, do not know what they want to specialize in. Industry changes so rapidly that a specialized training is obsolete before the man can use it."

(*b*) There is considerable comment in favor of the elimination of dictated lectures through the substitution of mimeograph material, textbooks, and reading assignments. This suggestion may provide the means of increasing the work on fundamentals on the basis that the elimination of any lecture courses would provide additional time.

(*c*) There is a need for more effective English courses. This should be accomplished by the improvement of present courses or by increasing the amount of work in English. A specific comment is quoted herewith, which is representative of those making this suggestion:

"A course in argumentation and public speaking is necessary. Too often, whether it is admitted or not, the ceramic engineer is the man who runs the plant, and far too frequently his inability to argue with business men and bankers, who have so little technical knowledge but who, at the same time, establish company policy, results in his not being recognized and the technical development of the plant does not progress rapidly."

(*d*) A course in business organization and related subjects is essential. The thought usually is expressed that a comparatively short course would answer the purpose, which probably could be given in the last year, and that existing textbooks could be used. One of the comments along this line, which also stresses the importance of English, is as follows:

"I am considering that the engineer is being developed for leadership and not for foremanship, which in the past has too often been the case. This last consideration demands the ability to get across ideas, a command of the English language; a knowledge of human nature, some psychology; and a knowledge of business because the engineer who cannot evaluate his ideas is dependent on the guidance of someone else, and he is too often left to struggle with immature ideas and no foundation."

(*e*) Technology courses are favored over strictly engineering courses. Among the technology courses that were specifically mentioned as being important were pyrochemical reactions and the subject of heat treatment in general, physical chemistry, geology, and mineralogy.

(*f*) Closer contacts with the industry are recommended. It is suggested that this can be accomplished by means of lectures by graduate engineers, maintenance of up-to-date data on material and processes used in the industry, and cooperation with the industry in the solution of plant problems.

Committee Suggestions

The Committee feels, in connection with this last item, that if the schools are willing to work on problems submitted by the industry, it could assist in this by acting as a point of contact between the schools and the industry. The Committee is willing to solicit the industry for problems and, after summarizing them and eliminating duplications, submit them to the various schools. By proper

allocation, it could be made certain that there would be no duplication of work at the schools and, also, that the problems are assigned as far as possible on the basis of the choice of each school. In soliciting the industry, it might be a good plan to contact only those who are Corporation Members of The Society in order to stimulate that class of membership which has been an important objective of The Society for some time. The reactions of the Ceramic Educational Council to this plan in general are welcomed.

Another suggestion that the Committee itself wishes to make is for work on the abstracting of ceramic literature. Specific subjects could be assigned to each student with a complete abstract of the literature to be made and a concise summarizing report written on the subject. This would not only make the student more familiar with existing literature but would also give him additional experience in the writing of reports, which is so often mentioned as an item of importance. Furthermore, if these reports could be made available through *The Bulletin of The American Ceramic Society*, it would undoubtedly be of considerable value to the industry, particularly if the industry were given an opportunity to make suggestions for assigned subjects. A plan possibly could be instituted whereby this Committee would act as a point of contact between the industry and the schools and as a clearing house for subjects submitted from the industry.

Finally, the Committee recognizes, and this is also borne out by many of the replies, that existing ceramic engineering curricula are already of a very high caliber, and the purpose of this work, therefore, is not to improve something that is unsatisfactory but only to try to find further improvements for something that now is adequate and of a high order. This is so well stated in two of the replies that they are being quoted herewith:

"I have a suspicion that most of our better schools turn out boys with enough equipment so that if they really are imbued with the idea of doing a good job, they can easily make up any shortcomings that they may be confronted with after they leave school."

"If a student absorbs all that he is supposed to in four years and makes reasonable application of the knowledge obtained, he will find himself pretty well prepared."

We hope, therefore, that the ceramic educators will receive these suggestions in that spirit, realizing that there has been no serious criticism of what has been accomplished, but, at the same time, acknowledging that there is always room for improvement, and progress can only be made by constantly going forward. The Committee is ready at all times to cooperate with the ceramic educators, particularly in connection with any ideas and plans which may be suggested by these questionnaires.

—E. H. Fritz, *Chairman;* R. M. Campbell, H. T. Coss, R. K. Hursh, and J. M. McKinley

CANADIAN CERAMIC SOCIETY APPRECIATION

Toronto, Canada
April 20, 1940

We wish to express our appreciation of the good will extended by The American Ceramic Society in holding its Forty-Second Annual Meeting in Toronto, Canada. Nothing could indicate to us better the kindly feeling that exists between the members of our two societies.

Let me express, also, on behalf of our Canadian Ceramic Society, your further indication of good will to us in giving our Secretary of nearly twenty-seven years such prominence in the April issue of your Society *Bulletin*.

Our Association was pleased to have you with us, and we hope that in a very few years we may again entertain you under more favorable circumstances.

With best wishes to you, your staff, and members and officers of The American Ceramic Society.

Yours sincerely,
Harold A. Bevens, *President,*
The Canadian Ceramic Society

NEW MEMBERS FOR MAY

Corporation

Bardin, Paul, e. Hijos Soc. Anon. Com., Pablo Pedro Bardin (voter), Pichincha 1245, Buenos Aires, Argentine.

Seagram, Joseph E., & Sons, Inc., A. Herman (voter), Seventh and Central, Louisville, Ky.

Personal

Buchholz, Russell A., Box 466, East Liverpool, Ohio (formerly in name of C. H. Peddrick, Jr., personal member).

Ficai, Celestino, via S. Maria Fulcorina 17, Milano, Italy; professor, Royal University of Bologne.

Martin, John E., 2410 West 18th St., Chicago, Ill.; manager, stoker division, Link-Belt Co.

McHugh, Michael J., Jr., 1403 Trenton Trust Bldg., Trenton, N. J.; Secretary-Treasurer, Consolidated Feldspar Corp.

Ridgon, Howard K., 15 Mentor Ave., Painesville, Ohio; district manager, Hiram Swank's Sons, Johnstown, Pa.

Santmeyers, George Selby, 812 Washington Drive, North Hills, Bellevue, Pittsburgh, Pa.; petrographer, Orefraction, Inc.

Schmid, Arthur W., 407 Peoples East End Bldg., Pittsburgh, Pa.; consulting engineer, *Glass Industry.*

Shuman, Albert, 630 Fifth Ave., New York, N. Y.; manager, Polarizing Instrument Co.

Tafel, Theodore, Jr., 33 Elderwood Drive, Toronto, Ontario, Canada; manager, Toronto Works-Standard Sanitary & Dom. Radiator.

Zapffe, Carl A., Battelle Memorial Institute, Columbus, Ohio; research associate.

Student

University of Illinois: Adolph B. Cosby.
University of North Carolina: Charles D. Taylor.
Ohio State University: Richard E. Steele.
Pennsylvania State College: William A. Scholes.

MEMBERSHIP WORKERS' RECORD

Corporation

Office	2		

Personal

R. M. Bowman	1	Basil Horsfield	1
J. L. Carruthers	4	Office	2
C. B. Delgado	2		

Student

A. I. Andrews	1	J. L. Carruthers	1
A. E. Baggs	1	W. W. Kriegel	1
		Grand Total	**16**

ROSTER CHANGES DURING MAY*

Personal

DerMott, W. P., Louisville & Nashville R. R., 908 W. Broadway, Louisville, Ky. (Savannah, Ga.)

Failmezger, Howard, 96 Colonial Village Rd., Rochester, N. Y. (Plainfield, N. J.)

Fulcher, Gordon S., 3647 Van Ness St., Washington, D. C. (Chevy Chase, Md.)

Hults, Eugene A., American Viscose Corp., Roanoke, Va. (Bristol, Va.)

Hyde, Collin, 1011 Riverside Ave., Wellsville, Ohio (Mexico, Mo.)

Lyon, Kenneth C., Armstrong Cork Co., Millville, N. J. (Cleveland, Ohio)

Moore, W. T., Babcock & Wilcox Co., Augusta, Ga. (New York, N. Y.)

Tuttle, George N., 309 Monteray Ave., Dayton, Ohio (Baltimore, Md.)

Wilcox, Herman G., 764 Montclair St., Pittsburgh, Pa. (Homestead, Pa.)

* Address in parentheses is former address.

Of Total Members for 1939 Only 99 Domestic Personal and 4 Corporations

Have Not Paid 1940 Membership Dues

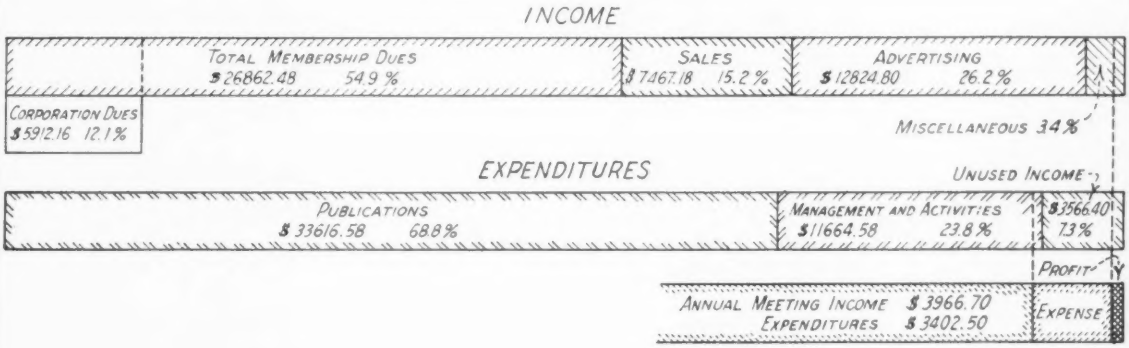
Paid Membership Record

Date of Record	Members paid		Deferred	Subscriptions	Monthly sales	Total circulation
	Personal	Corporation				
December 22, 1937	1713	220	12	523	220	2688
December 19, 1938	1815	222	26	589	220	2872
December 19, 1939	1876	237	27	642	220	3002
January 22, 1940	1930	244	23	656	220	3073
February 20, 1940	1972	243	30	669	220	3134
April 17, 1940	1724	241	30	522	220	2737
May 21, 1940	1801	247	27	552	220	2847
Unpaid Foreign	70	4		128		202
Total May 21, 1940	1871	251	27	680	220	3049

Why Corporation Members?

Why Meeting Registration Fees?

Here, Graphically, Is Your 1939 Financial Statement Based on Total Income



■ Total membership dues do not cover costs of publications.

■ Without income from Corporation dues, publications would be curtailed. The income from Corporations pays about one half the management and activities costs.

■ Without registration fees at Meetings, there would be no money with which to pay Meeting expenses. Each activity should be self-sustaining.

■ Ceramic Corporations, who in the end are financially benefited by the activities and publications of this Society, should be paying a larger percentage of the costs.

(1940)

DIVISION ACTIVITIES

REFRACTORIES DIVISION AUTUMN MEETING

The Refractories Division of The American Ceramic Society will hold its Autumn Meeting at the Summit Hotel, Uniontown, Pa., on September 6 and 7, 1940.

J. D. SULLIVAN, REFRACTORIES DIVISION TRUSTEE

John D. Sullivan is the newly elected Trustee from the Refractories Division.

Mr. Sullivan was born in Columbia Falls, Mont., February 4, 1900. In 1921, he received the degree of B.S. in chemistry from the University of Washington. A year later he took his M.S. degree in chemistry and metallurgy at the same University. He then did graduate work in physical chemistry at the University of California from 1923 to 1927. In 1927, he also took graduate work in mining administration at the University of Arizona.

John D. Sullivan, Trustee Representative, Refractories Division, 1940–1943

Between 1922 and 1923, Mr. Sullivan was analyst with the U. S. Bureau of Mines, Seattle, Wash. From 1923 to 1927, he was physical chemist with the Bureau of Mines, Berkeley, Calif. For the next four years, he was metallurgist with the Bureau of Mines, Tucson, Ariz. In 1931, he took his present position with Battelle Memorial Institute, Columbus, Ohio, as chief chemist.

Committees and Offices

The American Ceramic Society: 1936–to date, Chairman, Comm. on Publications; 1937–1939, Editorial Comm., Refractories Division; and 1940–1943, Trustee representing Refractories Division.

Other Societies: 1936–to date, Chairman, Comm. C–8 on Refractories, American Society for Testing Materials; 1937–to date, Vice-Chairman, Electrothermics Div., Electrochemical Society; and 1939–to date, Cupola Refractories Comm., American Foundrymen's Association.

Membership in Technical Societies

In addition to The American Ceramic Society, Mr. Sullivan is a member of the following technical societies: American Foundrymen's Association (company representative on committee work), American Institute of Mining and Metallurgical Engineers, American Society for Testing Materials (company representative on committee work), British Ceramic Society, Deutsche Chemische Gesellschaft, Deutsche Keramische Gesellschaft, Electrochemical Society, London Chemical Society, and Society of Glass Technology. Mr. Sullivan is also a member of Phi Lambda Upsilon and Sigma Xi honorary societies.

Publications

(With E. P. Barrett) "Simple Method for Determination of Tin in Iron and Steel," *Bur. Mines Rept. of Invest.*, No. 2459 (1923).

(With G. S. Tilley) "Note on Rational Analysis of Clays," *Jour. Amer. Ceram. Soc.*, **7** [5] 379–81 (1924).

(With E. D. Gardner and G. W. Jones) "Gases from Blasting in Heavy Sulphides," *Bur. Mines Rept. of Invest.*, No. 2739 (1926).

"Heavy Liquids for Mineralogical Analyses," *Bur. Mines Tech. Paper*, No. 381 (1927).

(With C. G. Maier and O. C. Ralston) "Passage of Solid Particles Through Rotary Cylindrical Kilns," *ibid.*, No. 384 (1927).

(With R. W. Miller) "Thermodynamic Properties of Oxygen and Nitrogen," *ibid.*, No. 424 (1928).

"Device for Maintaining a Constant Rate of Flow of Liquids," *Ind. Eng. Chem. (Anal. Ed.)*, **1** [4] 233 (Oct. 15) (1929).

(With G. L. Oldright) "Dissolution of Cuprite in Sulphuric Acid and in Ferric Sulphate Solution," *Bur. Mines Rept. of Invest.*, No. 2967 (1927).

"Dissolution of Various Oxidized Copper Minerals,' *ibid.*, No. 2934 (1929).

(With W. E. Keck and G. L. Oldright) "Factors Governing the Entry of Solutions into Ores During Leaching," *Bur. Mines Tech. Paper*, No. 441 (1929).

(With A. J. Sweet) "Factors Governing Removal of Soluble Copper from Leached Ores," *ibid.*, No. 453 (1929).

(With Morris Guggenheim) "Acceleration of Extraction of Soluble Copper from Leached Ores," *ibid.*, No. 472 (1930).

(With A. P. Towne) "Agglomeration and Leaching of Slimes and Other Finely Divided Ores," *Bur. Mines Bull.*, No. 329 (1930).

"Chemistry of Leaching Bornite," *Bur. Mines Tech. Paper*, No. 486 (1930).

"Chemistry of Leaching Chalcocite," *ibid.*, No. 473 (1930).

"Chemistry of Leaching Covellite," *ibid.*, No. 487 (1930).

"Apparatus for Circulating Liquids," *Eng. Mining Jour.*, **130**, 389 (1930).

(With E. O. Ostrea) "Factors Governing the Entry of

Solutions into Ores During Leaching, Part II," *Bur. Mines Tech. Paper*, No. 498 (1931).

"Leaching Copper from Ores," *Jour. Chem. Ed.*, **8**, 829–47 (1931).

(With K. O. Bayard) "Extraction of Soluble Copper from Ores in Leaching by Percolation," *Bur. Mines Rept. of Invest.*, No. 3073 (1931).

"Factors Involved in Heap Leaching of Copper Ores," *Bur. Mines Information Circ.*, No. 6425 (1931).

(With A. P. Towne) "Leaching Copper Ores: Advantages of Wet-Charging," *Bur. Mines Rept. of Invest.*, No. 3050 (1931).

(With G. L. Oldright) "Leaching Oxidized Copper Ores; Effect of Strength of Acid in Leaching Solvent," *ibid.*, No. 3106 (1931).

(With G. L. Oldright and W. E. Keck) "Method for Measuring Voids in Porous Materials," *ibid.*, No. 3047 (1931).

(With C. E. Williams) "Residual Metals in Open-Hearth Steel," *Metals & Alloys*, **4**, 151–52 (1933); *Amer. Inst. Mining & Met. Engrs., Minutes of 16th Semiannual Conf., Open-Hearth Comm.*, pp. 44–47 (1933).

(With C. E. Williams) "Residual Metals in Open-Hearth Steel," *Metals & Alloys*, **3**, 240–45 (1932).

"Chemical and Physical Features of Copper Leaching," *Trans. Amer. Inst. Mining Met. Engrs.*, **106**, 515–46 (1933).

"Residual Metals in Open-Hearth Steel," *Metals & Alloys*, **5**, 145–47 (1934); **6**, 134–37 (1935); *Amer. Inst. Mining & Met. Engrs., Minutes of 18th Open-Hearth Conf.*, pp. 85–91 (1935).

(With B. M. Bird), "Can Refractory Raw Materials Be Beneficiated?" *Amer. Refrac. Inst. Tech. Bull.*, No. 50, 11 pp. (1934).

(With H. E. Simpson and G. A. Bole), "Porcelain Enameling of Copper Presents Commercial Possibilities," *Ceram. Ind.*, **22**, 300–303 (1934).

(With E. D. Gardner) "Oxidation of Copper Sulphide Minerals in Copper Ores," *Mining Jour.*, **18**, 3 (Dec. 30, 1934).

(With S. L. Brown) "Dissolution of Various Copper Minerals," *Bur. Mines Rept. of Invest.*, No. 3228, pp. 37–41 (May, 1934).

"Physical Aspects of Refractory Insulation," presented at Fall Meeting, Ohio Ceramic Industries Assn., Nov. 1, 1935; abstract, *Brick & Clay Rec.*, **88** [2] 74–76 (1936).

(With C. E. Irion) "Application of Patina to Copper," *Architectural Forum*, **64**, 15, 80 (June, 1936).

"Notes on Some Foundry Refractories," *Trans. Amer. Foundrymen's Assn.*, **44**, 254–58 (Oct., 1936).

(With E. K. Pryor and G. L. Oldright) "Leaching Copper Ores; Study of Oxidation of Iron Solutions Used as a Solvent," *Bur. Mines Rept. of Invest.*, No. 3228, pp. 23–31 (May, 1934).

"Progress in Furnace Refractories," *Proc. Amer. Inst. Mining & Met. Engrs., Open-Hearth Comm., 19th Conf.*, pp. 85–91 (April, 1936); *Mining & Met.*, **17**, 299–301 (1936).

"Progress in Refractory Bricks in the United States," *Stahl u. Eisen*, **56**, 1138–39 (Sept. 17, 1936).

"Refractories in Metallurgical Industries," *Jour. Amer. Ceram. Soc.*, **19** [8] 213–33 (1936).

"Residual Metals in Open-Hearth Steel," *Proc. Amer. Inst. Mining & Met. Engrs., Open-Hearth Comm., 19th Conf.*, pp. 203–14 (April, 1936).

(With R. A. Witschey) "Residual Metals in Open-Hearth Steel," *Metals & Alloys*, **7**, 171–73 (July, 1936).

"Refractories," *Purchasing*, **5** [6] 52–53, 58–60 (1937).

"Refractories Testing," symposium (an extended abstract), *Metals & Alloys*, **8**, 297–302 (1937).

"Refractory Trends and Developments During 1936," *Blast Furnace & Steel Plant*, **25**, 88–91 (January, 1937); also *Heat Treating Forging*, **23**, 27–30 (January, 1937).

(With R. A. Witschey) "Residual Metals in Open-Hearth Steel," *Metals & Alloys*, **8**, 99–100 (1937).

(With R. P. Graham) "Critical Study of Methods of Determining Exchangeable Bases in Clays," *Jour. Amer. Ceram. Soc.*, **21**, 176–83 (1938).

"Improved Refractories," *Metal Progress*, **34**, 369–71 (October, 1938).

"Recent Trends and Developments in the Refractories Industry," *Refrac. Jour.*, **14**, 231–32, 235–36 (May, 1938).

"Refractory Trends and Developments During 1937," *Blast Furnace & Steel Plant*, **26**, 64–67, 98 (January, 1938); *Heat Treating Forging*, **24**, 39–42 (January, 1938).

"Uses, Trends, and Developments of Refractories in the United States," *Amer. Refrac. Inst. Bull.*, No. 66, pp. 71–75 (February, 1938); *Industrial Heating*, **5**, 257–64 (1938).

"Refractory Statistics and Trends," *Blast Furnace & Steel Plant*, **27** [1] 51–55 (1939).

(With R. P. Graham) "Improved Machine Shows Different Forms of Failure of Clay Bodies in Torsion," *Bull. Amer. Ceram. Soc.*, **18** [3] 97–100 (1939).

(With R. P. Graham) "Workability of Clays," *Jour. Amer. Ceram. Soc.*, **22** [5] 152–56 (1939).

"Physico-Chemical Control of Properties of Clays," *Trans. Electrochem. Soc.*, **75**, 71–98 (1939).

(With A. E. Pavlish) "Analysis for Residual Chromium in Steel," *Iron Age*, **143** [17] 38–39 (April 27, 1939).

"Residual Metals in Open-Hearth Steel," *22nd Annual Proc. Amer. Inst. Mining & Met. Engrs., Open-Hearth Comm.*, pp. 269–70 (1939).

(With A. E. Pavlish and James Shea) "Analysis for Lead in Plain Carbon Steel," *Metals & Alloys*, **10** [5] 150–51 (1939).

"High-Temperature Refractories," *Metal Progress*, **36** [4] 500–501 (October, 1939).

(With A. E. Pavlish) "The Mercury Cathode in Analytical Chemistry," *Metals & Alloys*, **11** [2] 56–59 (1940).

(With R. P. Graham) "Effect of Exchangeable Bases on Torsion Properties of Clays," *Jour. Amer. Ceram. Soc.*, **23** [2] 39–51 (1940).

(With R. P. Graham) "Effect of Exchangeable Bases on Absorption and Transverse Strength of Clay Bodies," *ibid.*, pp. 52–56.

(With R. P. Graham) "Effect of Exchangeable Bases on Drying Properties of Clay," *ibid.*, pp. 57–61.

(With A. E. Pavlish) "Tinning Copper and Brass by Immersion," *Metals & Alloys*, **11** [5] 131–34 (1940).

About twenty patents have been issued to Mr. Sullivan in the fields of ceramics and metallurgy.

TERRA COTTA DIVISION

Resolutions Adopted by Members on Discontinuance of Division

Los Angeles, California, April 1, 1940

WHEREAS, economic conditions prevailing in the terra-cotta manufacturing industry in the United States during the past few years have caused a lack of interest on the part of manufacturers and their technically trained employees in support of the Terra Cotta Division, and

WHEREAS, a canvass of the manufacturers employing members of the Terra Cotta Division discloses opposition to merging the Terra Cotta Division with any other Division of the Society, and

WHEREAS, said canvass indicates a preponderance of opinion in favor of discontinuance of the Terra Cotta Division; therefore be it

RESOLVED, That the Terra Cotta Division of The American Ceramic Society be discontinued and the present members thereof be so notified and requested to affiliate themselves with some other Division of The American Ceramic Society of their choice on an individual basis.

—F. B. ORTMAN, *Trustee of the Terra Cotta Division*, Gladding, McBean, & Company, Los Angeles, Calif.

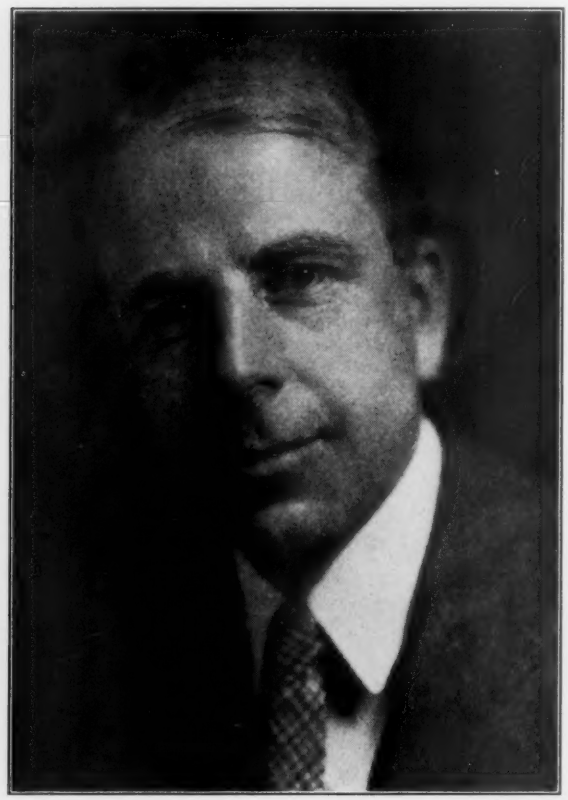
ART DIVISION CONFERENCE

Sixth Annual Conference and Workshop of the Southern Cooperative Art Education Association

July 29 to August 4, 1940, Blue Ridge, N. C.

The program for this Conference at Blue Ridge, N. C., as the word "workshop" implies, will be one of actual

participation for all those who attend, whether they are beginners or much more advanced artists. Each section of the Art Program will be under the direction of experienced artists, and there will be a number of resource people in each distinctive field.



H. S. Nash, Chairman of the Art Division, 1940–1941

Program

8:30 A.M. ART APPRECIATION

Led by Miss Michalena LeFrere Carroll of the Brooklyn Botanic Garden, Brooklyn, N. Y.

George Opdyke of the American Institute of Architects, New York, N. Y., has been invited to act as a resource person in this field.

9:45 A.M. DRAWING AND PAINTING

Led by Edward S. Shorter, Vice-President of the Southern States Art League, Columbus, Ga.

Wilford S. Conrow, National Secretary, the American Artists Professional League, Inc., New York, N. Y., has agreed to be present and to act as a resource person on portrait painting.

2:00–4:00 P.M. CERAMICS

Led by Kenneth E. Smith, Head of the Department of Ceramics, Sophie Newcomb Memorial College, New Orleans, La.

Ross C. Purdy, General Secretary, The American Ceramic Society, Columbus, Ohio, will be present as a resource person, and a number of the most successful commercial potters of the mountain region will be present.

Hewitt Wilson, Director of Ceramic Research at Norris Dam, has been invited to be present to lecture.

2:00–4:00 P.M. ETCHING

Miss Elizabeth White of Sumter, S. C., Miss Elizabeth O'Neill Verner of Charleston, S. C., and Miss Ruth Doris Swett of Southern Pines, N. C., have been invited to participate in the lectures and direction of this session.

EVENING HOURS

Gallery talks and motion-picture lectures will be under general direction of R. M. Grumman, director of University of North Carolina Extension Division, Chapel Hill, N. C.

Ceramic Exhibit

The Ceramic Department of Sophie Newcomb College, New Orleans, La., and Miss Anna Olmsted, originator of the National Ceramic Exhibition and Director of the Syracuse Museum of Fine Arts, Syracuse, N. Y., together with the best ceramists of the country, will have exhibits at Blue Ridge.

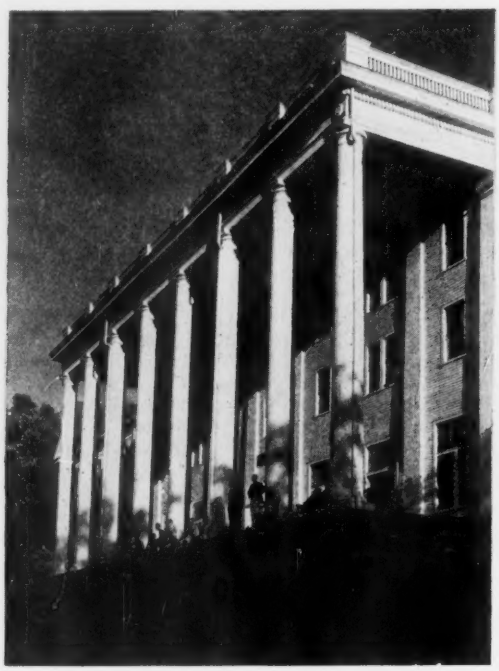
E. A. Hilton of Marion, N. C.; William J. Gordy, Georgia Art Pottery, Cartersville, Ga.; and W. E. Stephens, Pisgah Potteries, Arden, N. C., have been asked to exhibit. These men are commercial ceramists of this local region.

In the field of ceramics, the workshop will include an electric kiln, a hog kiln (which is now being erected at Blue Ridge), kick wheels, bench whirlers, and various types of clays. Papers on available ceramic raw materials in the South and kindred topics will be read.

Miss Anna Olmsted will be present for addresses in the field of ceramics and will be the speaker at the annual dinner on Friday night, August 2.

Ceramic Art Course

In addition to the Conference, Kenneth E. Smith will give a Ceramic Art Course running for six weeks, from July 22 to August 30.



Blue Ridge Hotel in North Carolina

Three studio hours may be taken daily for three credit hours. This course may be taken for six studio hours daily for double credit.

This course is designed for beginners as well as for advanced students of pottery. The aim is to acquaint the student with the limitations of the material and the processes of pottery making, decoration, and firing. It will include exploratory problems in the nature of ceramic raw materials; properties of clay, glazes, and bodies; the principles of firing; and the creative use of ceramic colors and textures.

The course is open to all persons of all ages. The equipment in the studio will permit a wide range of experiments in creative ceramic art by the individual student.

Tuition for the six weeks will be $12.00; for the double-credit course, $20.00; studio fee covering all materials, $3.00, and double credit, $5.00.

JAMES EDWARD HANSEN, ENAMEL DIVISION TRUSTEE

Mr. Hansen was born in Fowler, Indiana, in 1898. In 1918, he worked as chemist at the Benjamin Electric Company, Des Plaines, Illinois. He was graduated in Chemical Engineering from the University of Illinois in 1920, and from 1920 to 1926, he was Industrial Fellow at Mellon Institute of Industrial Research.

Since 1926, Mr. Hansen has been with the Ferro Enamel Corporation of Cleveland, Ohio, as research engineer, and since 1935 as service director. He is widely known in the enameling industry through his directorship of the many "enameling schools" sponsored by the Ferro Enamel

J. E. Hansen, Trustee Representative, Enamel Division, 1940–1943

Corporation and as a member of the Program Committee of the Porcelain Enamel Institute since 1937. He has been a member of the Canadian Ceramic Society since 1937.

Mr. Hansen has been a member of The American Ceramic Society since 1920 and a Fellow since 1931. He has served on several committees and was chairman of the Enamel Division in 1930–1931.

Publications

Technique of Vitreous Enameling. Enamelist Publishing Co., 1927.

Advanced Technique of Porcelain Enameling. Enamelist Publishing Co., 1932.

Editor, Manual of Porcelain Enameling. Enamelist Publishing Co., 1937.

"Modification of Empirical Formula in Glaze and Enamel Calculations," *Jour. Amer. Ceram. Soc.*, **5** [6] 338–45 (1922).

"Types of Enamel Smelters," *Fuels & Furnaces*, 2, 141–44 (1924).

"Exact Notions of Fluorine Enamels," discussion of paper by Charles Musiol, *Jour. Amer. Ceram. Soc.*, **7** [2] 115–17 (1924).

(With G. S. Lindsey) " 'Hairlines' in Sheet-Iron Enamels," *ibid.*, **8** [6] 356–60 (1925).

"Well-Insulated Doors Boost Furnace Production," *Ceram. Ind.*, **4**, 112 (1925).

"Fishscaling of Sheet-Iron Enamels," *ibid.*, **6**, 40 (1926).

(With G. S. Lindsey) "Factors Influencing Rate of Pickling of Sheet Iron," *Jour. Amer. Ceram. Soc.*, **9** [8] 481–92 (1926).

"Firing of Wet-Process Cast-Iron Enamels," *Enamelist*, **5** [1] 7 (1927).

"Notes on Shop Troubles," *ibid.*, **5** [3] 7 (1927).

"Effect of Mill Practice on Working Properties and Finish of Vitreous Enamels," *Jour. Amer. Ceram. Soc.*, **10** [7] 517–23 (1927).

"Firing Wet-Process Cast-Iron Enamels," *Enamelist*, **5** [1] 7 (1927).

"Mill Additions and Color Matching," *ibid.*, **5** [6] 19 (1928).

"Cleansing Sheet-Metal Objects Before Enameling," *Brit. Ind. Finishing* [London], **2** [11] 148; [20] 170–74 (1931).

(With H. E. Ebright) "Peculiarity of Sheet-Iron Acid-Resisting Cover-Coat Enamels," *Jour. Amer. Ceram. Soc.*, **16** [9] 433–36 (1933).

(With J. T. Irwin) "Nickel Dip in Enameling Practice," *ibid.*, **18** [8] 225–29 (1935).

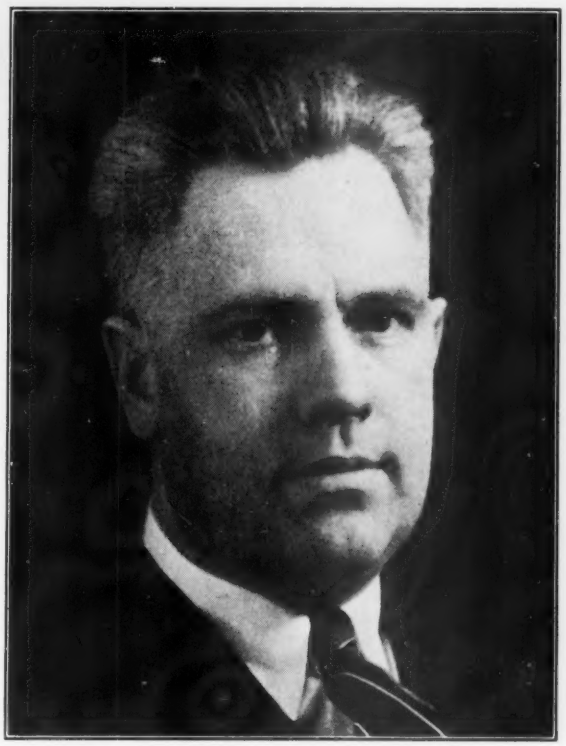
"Factors Affecting Suspension and Consistency of Milled Enamels," *Jour. Can. Ceram. Soc.*, **6**, 69 (1937).

(With G. H. McIntyre) "Factors in Producing One Cover-Coat Enamels," *ibid.*, **7**, 55 (1938).

"Furnaces," *Proc. Porcelain Enamel Inst. Forum* (*First Forum*), pp. 87–93 (May, 1937).

"Workable Control Systems and Benefits to Enamel Plant," *Proc. Porcelain Enamel Inst. Forum* (*Second Forum*), pp. 4–21, (October, 1937).

"Milling Porcelain Enamel," *Emaillerie*, **6** [7] 11; [8] 9; [9] 7; [10] 26 (1938).



Sandford S. Cole, Secretary of the Materials and Equipment Division

(1940)

LOCAL SECTION NEWS

MICHIGAN-NORTHWESTERN OHIO

March Meeting

The Michigan-Northwestern Ohio Section met at the Stockholm in Detroit, Mich., on March 22, 1940. Following a smörgasbord dinner, Dr. Richard Ettinghausen of the Near Eastern Art Department, University of Michigan, spoke on "Ceramics in the Near East." More than fifty persons attended the meeting.

The following officers were elected for 1940–1941:

Chairman: R. O. LANE, Macklin Co., Jackson, Mich.
Vice-Chairman: J. A. FOSTER, Ford Motor Co., Dearborn, Mich.
Secretary-Treasurer: J. F. QUIRK, A C Spark Plug Co., Flint, Mich.

May Meeting

On May 17, the Section held a dinner meeting at the Hotel Hayes in Jackson, Mich. After dinner, color films showing their effort in the "Conservation of Michigan Natural Resources and Reforestation Program" were presented by the Consumers Power Company.

PITTSBURGH

March Meeting

The Pittsburgh Section of The American Ceramic Society met at Mellon Institute on March 12. Philip Dressler of the Swindell-Dressler Corporation, Pittsburgh, spoke on "Recent Developments in Tunnel-Kiln Construction and Operation." This talk, originally scheduled for the January meeting, was postponed owing to the illness of Mr. Dressler.

May Meeting

W. A. Weyl, Pennsylvania State College, State College, Pa., spoke on "Decolorization and Tinting of Glass" at the meeting of the Section on May 14 at Mellon Institute.

CERAMIC SCHOOL NOTES

P. G. HEROLD HEADS CERAMIC ENGINEERING DEPARTMENT

Paul G. Herold has been appointed head of the Ceramic Engineering Department of the Missouri School of Mines and Metallurgy at Rolla, Mo. For the past year, he has been acting head of the Department during the leave of absence of C. M. Dodd, former head.

IOWA STATE COLLEGE

On May 9, 10, and 11, Iowa State College held its 19th Annual Veishea, the spring festival and open house of the college. The program for May 10 included an open house in every department on the campus. The laboratories of the Ceramic Engineering Department were open for inspection during this period, and demonstrations were given of enameling sheet iron in an electric furnace and the manufacture of drain tile on a laboratory deairing pug mill. Another demonstration showed the mechanical shock-resisting properties of Herculite. A moving picture, furnished by Pittsburgh Plate Glass Co., showed the manufacture of various glass products. There were also displays of samples of refractories, glass, pottery, abrasives, enamels, and structural clay products.

The new officers of the Iowa State Branch for the year 1940–1941 were elected on April 25. They are LLOYD L. WELLS, *President;* CARL WEST, *Vice-President;* and W. J. HARR, *Secretary-Treasurer.*

—MAURICE W. GORMLY, *Corresponding Secretary*

GLASS CONFERENCE PROGRAM

Held at the University of Illinois

The Sixth Conference on Glass Problems was held May 10 and 11, in Urbana, Ill. These conferences, which are sponsored by the Department of Ceramic Engineering of the University of Illinois and the Chicago Section of The American Ceramic Society, are designed to promote an interchange of ideas among men engaged in the practical operation of glass plants. About ninety-six persons from out of town attended the Conference.

The program consisted of the following reports and papers.

Friday, May 10, 1:30 P.M.

C. W. PARMELEE, *Chairman.*

"Welcome," by M. L. ENGER, Dean, College of Engineering.

"Departmental Research Activities," by C. W. PARMELEE, Head, Dept. of Ceramic Engineering.

"Methods of Binding Glass Batch," by R. L. SHUTE, Dept. of Ceramic Engineering.

"Chemical Durability of Glassware from the Distiller's Standpoint," by A. HERMAN, Joseph E. Seagram & Sons, Inc., Louisville, Ky.

"Use of the Employee's Suggestion Box in Glass Factories," by W. S. KAHLSON, Pitney Glass Works of General Electric Co., Cleveland, Ohio.

"Summary of Recent Technical Literature of Interest to Operating Men," by A. E. BADGER, Dept. of Ceramic Engineering.

Following the informal dinner held on Friday evening, the group met in the Physics Building to hear a lecture "Science in Nature" by C. F. Hottes, professor of plant physiology, emeritus. Professor Hottes showed colored moving pictures.

Saturday, May 11, 9:30 A.M.

G. G. HANSON, *Chairman.*

"The Monday Morning Start-Up," by W. J. MATHEWS, Lapel, Ind.

"Controlled Tank Pressure and Combustion," by I. G. FOWLER, Libbey-Owens-Ford Glass Co., Ottawa, Ill.

"Progress Report on Cast-Iron Molds for the Glass Industry," by H. L. WALKER, Dept. of Metallurgy.

"Modern Plastics" (illustrated), by F. W. WARNER, General Electric Co., Pittsfield, Mass.

FIFTH CLAY PRODUCT PLANT OPERATORS, CONFERENCE

Held at the University of Illinois, May 24 and 25

The Clay Product Plant Operators' Conference, sponsored by the Department of Ceramic Engineering at the University of Illinois in cooperation with the Illinois Clay Manufacturers' Association, was held on May 24 and 25.

These conferences are planned particularly for men who are engaged in plant operation and who are directly concerned with the problems of manufacturing clay products.

The programs are devoted to papers and discussions on these problems and afford information and viewpoints which are of definite interest and value to the superintendent, foremen, and others who have daily contact with plant operations. Open discussions give opportunity for exchange of ideas and experiences which frequently bring out the solution of a difficulty and the correction of a fault in some phase of the manufacturing procedure.

Friday, May 24, 1:30 P.M.

The principal subject for this session was the investigation of the properties of Illinois clays and shales for mortar mix.

"Address of Welcome," by H. H. Jordan, Associate Dean, College of Engineering.

"Sampling and Physical Characteristics of the Clays and Shales," by J. E. LAMAR, Illinois State Geological Survey.

"Mineralogical Characteristics of the Clays and Shales," by R. E. GRIM, Illinois State Geological Survey.

"Properties of Mortar Mixtures," by R. K. HURSH, Dept. of Ceramic Engineering.

"Effects of Some Electrolytes on the Drying Characteristics of Certain Clays," by J. A. PASK, Dept. of Ceramic Engineering.

The annual meeting of the Illinois Clay Manufacturers' Association was held at 7:30 P.M., followed by a discussion on "Building Blocks."

Saturday, May 25, 9:30 A.M.

"The Burning Problem in Ceramics," by G. L. BALLARD, Illinois Natural Gas Co., Springfield, Ill.

"Some New Developments in Stoker Firing of Kilns," by J. E. MARTIN, Link-Belt Co., Chicago, Ill.

"Auger Problems," by F. S. WINDOLPH, Chambers Brothers Co., Philadelphia, Pa.

"Plant Operation," by R. H. WESTON, Arketex Corp., Brazil, Ind.

CERAMIC OPERATIVES' INSTITUTE

Held at Ohio State University

Tuesday, May 14, 2:00 P.M.

"Welcome," by CHARLES E. MACQUIGG, Dean, College of Engineering.

"Where Are We Going with Our Ceramic Products?" by ROSS C. PURDY, General Secretary, The American Ceramic Society.

"Dust Control," by EMERY R. HAYHURST, Consulting Industrial Hygienist, Columbus, Ohio.

"Electrical Control," by H. W. BIBBER, Electrical Engineering Dept.

"Light Control," by W. E. CONLEY, Illuminating Engineer, General Electric Co., Cleveland, Ohio.

Tuesday, May 14, 8:00 P.M.

Sponsored by the Ohio State Student Branch of The American Ceramic Society.

"The Industrial Revolution in Clay Products Manufacture," by R. E. BIRCH, Harbison-Walker Refractories Co., Pittsburgh, Pa.

"Surface Chemistry," movie by IRVING LANGMUIR.

Wednesday, May 15

Refractories Division

G. A. BOLE, *Chairman*, assisted by C. E. BALES, Ironton Fire Brick Co., Ironton, Ohio; S. E. RUTH, Harbison-Walker Refractories Co., Portsmouth, Ohio; L. J. TROSTEL, General Refractories Co., Baltimore, Md.; and H. E. NOLD, Dept. of Mine Engineering.

Lectures and discussions were given in the morning on (1) "Clay Winning," (2) "Control Testing," and (3) "Blending." In the afternoon, there were demonstrations of (4) "Forming," (5) "Deairing," and (6) "Product Testing."

Structural Clay Products Division

J. L. CARRUTHERS, *Chairman*, assisted by CHESTER A. AUSTIN, Battelle Memorial Institute; H. Z. SCHOFIELD, Research Engineer, National Paving Brick Manufacturers Assn.; and G. H. DUNCOMBE, Battelle Memorial Institute.

Lectures and discussions were given in the morning on (1) "Raw Material Control," (2) "Clay Winning," and (3) "Clay Storage." Demonstrations were given in the afternoon on (4) "Grinding and Screening," (5) "Tempering," and (6) "Forming."

White Wares Division

A. S. WATTS, *Chairman*, assisted by T. A. KLINEFELTER, National Bureau of Standards, Washington, D. C., and ARTHUR A. WELLS, Homer Laughlin China Co., Newell, W. Va.

Lectures and discussions were given on (1) "Materials and Their Quality Control," (2) "Body Preparation for Plastic Molding," and (3) "Body Preparation for Casting." Demonstrations were given on (4) "Forming: Jiggering," (5) "Forming: Casting," and (6) "Glaze and Glaze Control."

Thursday, May 16

General Session for All Divisions

J. L. CARRUTHERS, *Chairman*, assisted by staff.

"Control of Drying Systems and Operations," and "Control of Firing of Clayware," with lectures, discussion, and demonstrations.

OHIO STATE UNIVERSITY

The Student Branch of The Society held a joint meeting in conjunction with the first Ceramic Operatives' Institute at the Social Administration Building on May 14, at 8:00 P.M.

President Petty opened the meeting by introducing R. E. Birch, Harbison-Walker Refractories Co., Pittsburgh, Pa., who spoke on "The Industrial Revolution in Clay Products Manufacture." Mr. Birch used a series of slides to illustrate the various mechanical inventions applied to ceramic manufacture, tracing from the Industrial Revolution in England down to our present-day times.

Movies were presented on the "Romance of Pottery" and "Making Indian Pottery." The former showed the manufacturing process of the Gladding, McBean, & Company in California; the latter was presented by Professor Baggs, Department of Ceramic Arts, Ohio State University, who also displayed some excellent samples of this ware. A movie was also given on the Simpson mixer operation and equipment.

Professor Watts, Department of Ceramic Engineering, presented the Ceramic Data Books to the five juniors who led their class in grades during the winter quarter. They include Robert S. Hower, J. Allen Pierce, Arthur E. Currier, J. Ted McQuaide, and Donald E. Postlewaite.

Election of Officers

On May 21, the Student Branch met in Lord Hall to elect the following officers for 1940–1941: *President*, DONALD E. POSTLEWAITE; *Vice-President*, JAMES JACOBY; and *Junior Representative to Engineers' Council*, JOHN SEMMELMAN. Preceding the election, Howard Petty, the Student Branch representative to the Annual Meeting, reported on his trip to Toronto.

—D. E. POSTLEWAITE, *Secretary-Treasurer*

LAMMÉ MEDAL AWARDED TO L. E. BARRINGER

L. E. Barringer, Trustee of the Art Division of The Society, was awarded the Lammé Medal at the Ohio State University convocation exercises held June 10.

The Medal, a memorial to Benjamin G. Lammé, Ohio State graduate of 1888, is given each year to an alumnus distinguishing himself in the field of engineering.

Mr. Barringer's many friends in The Society will be pleased that he has received this well-merited award.

NECROLOGY

JOHN MILTON McKINLEY

John Milton McKinley, a member of The American Ceramic Society since 1918 and President of The Society in 1935–1936, died in Cleveland on May 19. He was widely known in the steel industry, in which he spent his early years, and also in refractories. Not so well known to many of his technical associates is the fact that he contributed to the art of photography and was an ardent amateur musician.

John Milton McKinley, 1882–1940

He was of Scotch-Irish descent and was born near Elizabeth, Pennsylvania, July 29, 1882, in a little farming community known as Shire Oaks. Later, the family lived in Lebanon and Indianapolis, Indiana, where he attended grade and high school. While in high school he revealed a marked tendency toward mechanics and his first job was with a printing concern. In 1898, he worked as a millwright and machinist in Pittsburgh, and the following year he was employed by the American Steel Hoop Company as a draftsman on construction layout, including work in minor details of design.

Although his formal education ended before completion of high school, Mr. McKinley's career included considerable instruction under able tutors. Among his teachers were John A. Brashear, of Alleghany University and Carnegie Institute, with whom Mr. McKinley studied mathematics in 1900 and 1901. In this same period, he also did extensive work under Karl Kohlkebeck (Julian Kennedy) in drafting, machine design, strength of materials, and structural design. From 1900 through 1904, he completed various courses with correspondence schools, and in 1914 and 1915 he received personal instruction in chemistry under G. G. Pond of the Pennsylvania State College. In a very real sense, he educated himself under the guidance of masters rather than by formal college attendance. Mr. McKinley once told us that early in the 1900's he passed the examinations for Cornell but, as he said, "was confronted by such a substantial increase in salary and extension in authority and experience that I was led to abandon the idea of a college course, whether wisely or not I shall never know."

From 1900 to 1904, he was employed by the Clairton Steel Company (Carnegie Steel Company) at Clairton, Pa., on detail design and field construction, including civil engineering work on the construction of buildings, railroads, sewers, and bridges. During the last two years of this period, he was superintendent of construction in charge of all divisions of steel-mill and blast-furnace construction, a remarkable responsibility for a man of twenty to twenty-two years of age.

The steel industry of the early 1900's exacted long working hours, and in his blast-furnace work, Mr. McKinley was confronted with many a week in which he was on duty for seventy-two hours at a stretch. The effects on his health were such that in 1904 he took a position with Harbison-Walker Refractories Company as a salesman, and a year later he went with Fayette Fire Brick Company (later United Fire Brick Company) at Uniontown, Pa. During this period he married Margaret Hopwood of that city.

He then left the Fayette Fire Brick Company to serve as superintendent of Brady's Bend Fire Brick Company at Brady's Bend, Pa., but depression and bank failures caused this venture to turn out badly, and he returned to his former job with Fayette Fire Brick Company, "with a handsome cut in salary."

In 1909, he became connected with Bickford Fire Brick Company (later Crescent Refractories Company and now a division of North American Refractories Company) at Curwensville, Pa., where he worked in civil, mining, and ceramic engineering (including plant design and construction) and refractories service engineering. After 1914, Mr. McKinley was in executive charge as vice-president of operations and research.

In 1929, the Crescent plants were merged into North American Refractories Company and Mr. McKinley and his family (his wife, son, and three daughters) became residents of East Cleveland, Ohio. There he served as vice-president of operations and research with North American Refractories Company until his death last month at the age of fifty-seven.

Among his significant achievements were contributions to the national classifications and standardization of refractory shapes, his large share in establishing specifications and tests for refractories, his improvements in dry-press and extrusion processes and in deairing clay bodies, and the development of new bonding materials for fire brick. Much of his research during the period after 1930 was in the development of long-life refractory materials through the use of aluminate and other compounds.

Mr. McKinley will be remembered as a Fellow of The American Ceramic Society (1931) and as its Vice-President (1934) and President (1935–1936). He fought shy of casual membership in learned societies and preferred, instead, to concentrate his activities in The American Ceramic Society, the American Society for Testing Materials, and the American Refractories Institute. In the Refractories Institute, he served four years as classification engineer, one year as vice-president, and two years as president.

At the time of his death, he was President of the Board of Trustees of the Edward Orton, Jr., Ceramic Foundation of Columbus, Ohio. He also held a membership in the Institute of Ceramic Engineers and in the national professional fraternity, Keramos. In 1936 he was honored with

the professional degree of Ceramic Engineer by Alfred University.

Mr. McKinley followed two hobbies with a high degree of intensity. Soon after his marriage to "Madge" McKinley, he determined to keep her company in her music by study of the violin. Together, they organized an orchestra which was well known in the central Pennsylvania area where they lived. For a number of years, this orchestra accompanied the musical comedies given in the Clearfield County theatres and leading silent films were provided with musical backgrounds arranged by him. Local commencements and church or civic activities invariably included the orchestra which he directed. In this period Mr. McKinley also organized and directed a full-size symphonic band—for the Curwensville community in which he lived included many fine Italian musicians, some of whom later became members of nationally known orchestras and bands. The home life of the family was unusual in that each member played a stringed instrument, and it was possible to organize quartets and quintets on a moment's notice.

In the field of photography, Mr. McKinley made a number of original contributions, including special studies in the art of bromoil transfer and in the chemistry of photography. He was a director in the Cleveland Photographic Society and his memberships included the Ceramic Camera Club, of which he was President, and the New York Camera Club. His prints were widely exhibited in this country and abroad, and he was honored by the Royal Photographic Society of London.

We close this account with a brief excerpt from a letter written by Mr. McKinley to our Secretary, Ross Purdy. It reveals so well the philosophy of this man who has just left us.

"All my life I have had little or no use for single facts as such. I have had no desire to group facts in a mathematical relationship, but have always had the philosophy first in mind based on some imaginative correlation of facts. I have then proceeded to check the philosophy mathematically or to have it checked.

"My experience with men over many years leads me to believe that more men fail by having too much knowledge than too little. Vision is destroyed. Perhaps the best expression I can give you is that I classify the engineer in the same category as the musician and poet.

"I believe the successful men of the forthcoming generation will be those of sound philosophical attainment with social instincts of the more liberal type."

Publications

"Discussion on Proposed Merger of American Refractories Institute and American Ceramic Society," *Bull. Amer. Ceram. Soc.*, **8** [1] 12–22 (1929).

"Federation of Ceramic Associations," *ibid.*, **8** [3] 43–45 (1929).

"Conference on State Ceramic Associations," *ibid.*, **8** [11] 338–45 (1929).

"Proposal for Correlation of Ceramic Research," *ibid.*, **12** [4] 89–91 (1933).

"Report of Committee on Research," *ibid.*, **14** [3] 122–23 (1935).

"Comments on the Refractories Industry," *Amer. Refrac. Inst. Tech. Bull.*, No. 59, 10 pp. (June, 1935); *Ceram. Abs.*, **15** [7] 209 (1936).

"Presidential Address," *Bull. Amer. Ceram. Soc.*, **15** [4] 153–54 (1936).

"Discussion on Checker Brick and Regenerators," *ibid.*, **16** [4] 152–55 (1937).

"Report on the Edward Orton, Jr., Ceramic Foundation," *ibid.*, **16** [5] 215–16 (1937).

(With R. R. Robinson) "An Investigation of Power Reduction and Moisture Control in Waste-Heat Drying," *Jour. Amer. Ceram. Soc.*, **21** [3] 104–108 (1938).

(With S. M. Phelps) "Spalling of Silica Brick During Heating and Cooling of Furnaces," *ibid.*, **22** [3] 83–88 (1939).

Patents

(With W. K. Carter) "Fired Siliceous Tribarium Aluminate Refractory," U. S. Pat. 2,017,723, Oct. 15, 1935; *Ceram. Abs.*, **15** [1] 25 (1936).

(With W. K. Carter) "Siliceous Refractory," U. S. Pat., 2,019,542, Nov. 5, 1935; *Ceram. Abs.*, **15** [1] 26 (1936).

(With W. K. Carter) "Ceramic Patching Cement," U. S. Pat., 2,102,327, Dec. 14, 1937; *Ceram. Abs.*, **17** [2] 75 (1938).

(With W. K. Carter) "Ferruginous Siliceous Refractories," U. S. Pat., 2,108,543, Feb. 15, 1938; *Ceram. Abs.*, **17** [5] 189 (1938).

DAVID BURTON

The death of David Burton, Managing Director of the firm of Pilkington Tiles, Ltd., of Clifton Junction near Manchester, occurred on March 28, 1940.

David Burton was born in Pendlebury in 1897, the son of the late Joseph Burton and nephew of William Burton, both illustrious potters. He was educated at the Manchester Grammar School and Manchester University. When the Great War broke out in 1914 while he was still at the University, he was unable because of defective eyesight to serve with the forces. He left the University, however, to work at the Pilkington Tile & Pottery Company, where he gained an extensive and intimate knowledge of the work. In 1928, he became a director and works manager of the Pilkington Tile & Pottery Works. On the death of his father in 1934, he became managing director, and he completely reorganized the works, converting them into a modern factory. In so doing, he carried on that policy which, in his father's time, had resulted in the Pilkington Pottery being one of the first in England to build and fire a tunnel kiln.

As a director of Pilkington Tiles, Ltd., Mr. Burton was actively connected with the Glazed and Floor Tile Manufacturers' Association. He was appointed a member of the Managers' Committee of that body and served for some years on the Research Committee.

He leaves a widow, two sons, and a daughter.

Mr. Burton had been a member of The American Ceramic Society since 1936.

(1940)

C. H. DOLFINGER

Once prominent in the production of fine glassware and and fine cut glass, Charles H. Dolfinger died on April 14 at his home in Honesdale, Pa., at the age of eighty-two years. Mr. Dolfinger had been an executive of C. Dolfinger & Sons for many years. This Company was a large manufacturer of glassware, including blanks for cut glass as well as an extensive line of cut glass. The factory, which operated four pot furnaces for a long period, was at White Mills, Pa. Mr. Dolfinger, who was born in Brooklyn, N. Y., resided in White Mills for more than fifty years. The Dolfinger factory ceased operations in 1927.

The American Ceramic Society Exhibit contains an inkwell made by Mr. Dolfinger, and it is one of the many rare and fine pieces in the office.

WILLIAM PEACOCK, JR.

William Peacock, Jr., founder and president of Peacock Laboratories, Inc., Philadelphia, a subsidiary of the Libbey-Owens-Ford Glass Company since December, 1939, died on May 20 of a heart ailment. Mr. Peacock, a metallurgist, recently discovered a mirror silvering process resulting in a complete change in the manufacturing methods of an industry which had remained virtually unaltered for more than a century.

NOTES AND NEWS

E.C.P.D. RECOGNITION FOR GRADUATES OF NONDEGREE INSTITUTES AND SCHOOLS

Representatives of eleven of the nondegree institutes and schools recently authorized Parke R. Kolbe, president of Drexel Institute of Technology, to present the following petition to E.C.P.D.

"For many years, leading authorities of the world of engineering education have emphasized the importance of the nondegree or technical institute engineering program. They have encouraged the establishment of these schools as filling a definite need for men of a training shorter and less theoretical than that given in the degree-granting engineering college. At the same time, nothing has ever been done to recognize, accredit, or legitimize the certificate granted by this type of institution. As a result, the graduates of these schools have found themselves, in many cases, at a definite disadvantage, since the training which they have secured receives little or no recognition from the engineering profession, as well as from many industrial employers who are naturally in doubt as to the meaning of the nondegree certificate. The representatives of the institutions here assembled do therefore petition the Engineers' Council for Professional Development, through its Committee on Engineering Schools or such other appropriate committee as it may appoint, to institute a study of the nondegree programs, both day and evening, now existing in this country, and to devise and propose such a plan of recognition or accrediting as may seem wise and just."

After consideration of the above petition at its April meeting, the Executive Committee of E.C.P.D. authorized Chairman J. P. H. Perry to request the Council's Committee on Engineering Schools, under the chairmanship of Dean A. A. Potter, to appoint a special subcommittee to make a careful study of the petition and to present a report after such study at the annual meeting of E.C.P.D., to be held in Pittsburgh in October, 1940. The Executive Committee also advised President Kolbe as to its action and added the statement that it was much interested in the relationship of technical institutes to the engineering profession and in the apparent need for some further recognition in the form of accrediting or otherwise of such institutes.

FAME EARNED BY CAPTAIN ROWLAND

Captain Roger W. Rowland, president of the New Castle Refractories Company and Secretary of Property and Supplies, Commonwealth of Pennsylvania, was the subject of the following comments in the column "Capital Hill" in the *Harrisburg Telegraph*, April 24, 1940.

"Captain Roger W. Rowland, Secretary of Property and Supplies, is the first member of the James cabinet to be put in a book. And it is about his war record, something on which he never talks and a good many folk on the Hill do not know.

"Stackpole Sons has issued a book called Up and at 'Em by Commander Hartney, of the First Pursuit group, A.E.F., which is an excellent story of the organization and fighting of the American flying force overseas.

"The book contains the names of all the pilots of the group with cold official records. It shows the number of German planes brought down by each flying fighter, and the Captain has two back of his name. Now this means that the modest man from New Castle was a combat flyer. It is something to have that in a career notable for business success, good political generalship, and the handling of State property worth anywhere from $100,000,000 up."

A biographical sketch of Captain Rowland was published in the March, 1939, *Bulletin*, p. 105.

CHARLES L. SEBRING

On April 1, Charles L. Sebring assumed his new duties as general sales manager of the Edwin M. Knowles China Company of East Liverpool, Ohio. Mr. Sebring has moved to East Liverpool from Sebring, Ohio, which was founded by his family and where he had lived for thirty-five years. The factory, employing approximately 1200 persons, is located in Newell, W. Va.

He has been associated with the industry in Sebring since December, 1904. He joined the Sebring Pottery Company staff after the death of his uncle, Will H. Sebring.

Mr. Sebring was instrumental in building the Leigh Pottery at Alliance, Ohio, and also was actively identified with the Limoges China Company of Sebring and the Salem China Company of Salem, Ohio. For many years he was president of the Sebring and Leigh companies and until recently was chairman of the board of the Sebring-Limoges-Salem interests. He is now director of each of the three companies; chairman of the United States Potters Association executive committee; president of the Associated Glass and Pottery Manufacturers; and manager of the New York China and Glass Manufacturers Association.

OHIO CERAMIC INDUSTRIES ASSOCIATION

The second annual spring picnic of the Ohio Ceramic Industries Association was held May 23 at the Shady Hollow Country Club near Massillon, Ohio.

A.S.M.E. THREE-CITY SUMMER MEETING

Week of June 17, 1940

For the first time in the history of the American Society of Mechanical Engineers, the 1940 Semi-Annual Meeting will be held in three cities at the same time. Simultaneous meetings will be held in Milwaukee, Wis., at the Hotel Pfister, June 17 to 20; in Ann Arbor, Mich., at the University of Michigan, June 20 to 21; and in Asbury Park, N. J., at the Berkeley-Carteret Hotel, June 19 to 22. More members will be afforded an opportunity to attend one group of technical sessions and to take part in the attendant social functions. Erik Oberg is chairman of the A.S.M.E. Meetings and Program Committee.

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Vice-President: J. T. Littleton, Corning Glass Works, Corning, N. Y.
Treasurer: C. Forrest Tefft, The Claycraft Co., Box 866, Columbus, Ohio
Secretary-Editor: R. C. Purdy, 2525 North High St., Columbus, Ohio
Past-President: A. I. Andrews, University of Illinois, Urbana, Ill.
Past-President: V. V. Kelsey, Dominion Minerals, Inc., Shoreham Bldg., Washington, D. C.

TRUSTEES FROM INDUSTRIAL DIVISIONS*

Art: L. E. Barringer, General Electric Co., Schenectady, N. Y. (1943)
Enamel: J. E. Hansen, Ferro Enamel Corp., Cleveland, Ohio (1943)
Glass: D. E. Sharp, Hartford-Empire Co., Hartford, Conn. (1941)
Materials and Equipment: H. B. DuBois, Consolidated Feldspar Corp., Trenton, N. J. (1942)
Refractories: J. D. Sullivan, Battelle Memorial Inst., Columbus, Ohio (1943)
Structural Clay Products: A. F. Greaves-Walker, Univ. of North Carolina, Raleigh, N. C. (1942)
Terra Cotta: F. B. Ortman, Gladding, McBean, & Co., Los Angeles, Calif., (1942)
White Wares: E. H. Fritz, Westinghouse Electric & Mfg. Co., Derry, Pa. (1941)
Institute of Ceramic Engineers: R. E. Birch, Harbison-Walker Refractories Co., Pittsburgh, Pa. (1941)
Ceramic Educational Council: A. S. Watts, Dept. of Ceramic Engineering, Ohio State Univ., Columbus, Ohio (1941)

* Date of expiration of term of office in parentheses.

DIVISION OFFICERS

Art
Chairman: H. S. Nash, Univ. of Cincinnati, Cincinnati, Ohio
Secretary: C. C. Engle, United Clay Mines Corp., Trenton, N. J.

Enamel
Chairman: J. D. Tetrick, Baltimore Enamel & Novelty Co., Baltimore, Md.
Secretary: D. G. Bennett, Mellon Institute, Pittsburgh, Pa.

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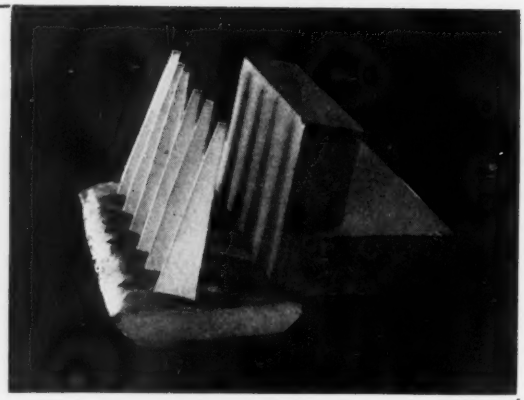

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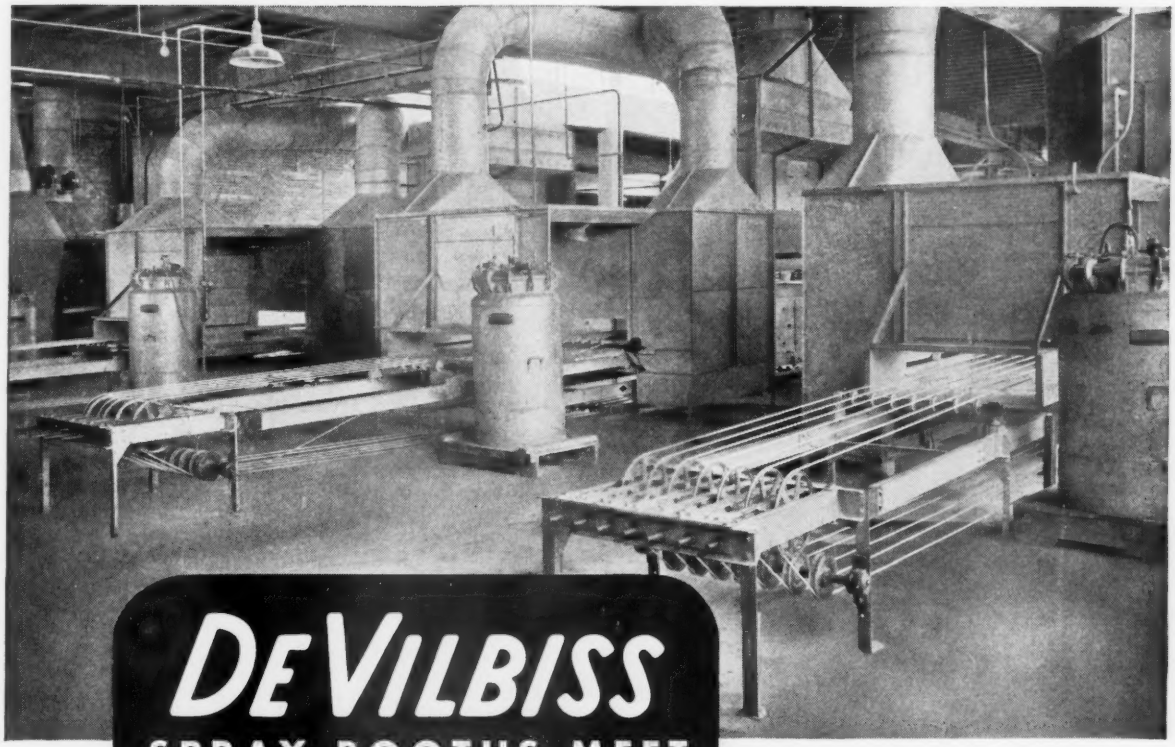

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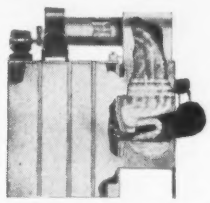
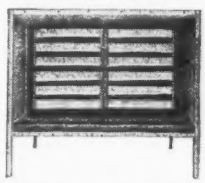


Water Wash—centrifugal and nozzle types



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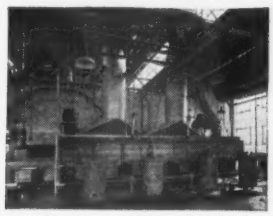

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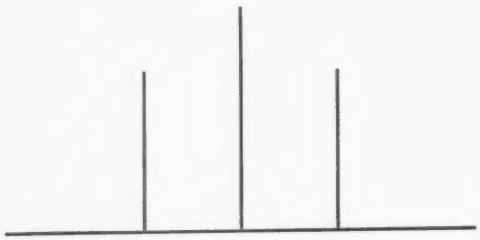

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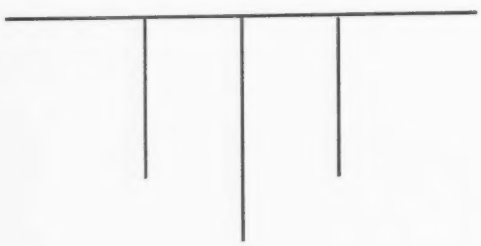

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Clay (Wad)
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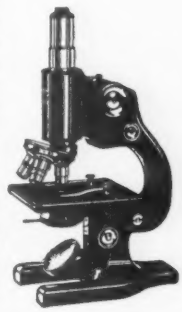

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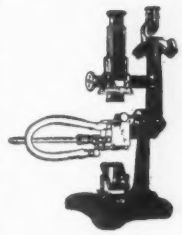

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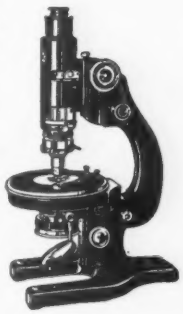

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Denver Fire Clay Co.
McDanel Refractory Porcelain Co.
Montgomery Porcelain Products Co.
Norton Co.

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Leeds & Northrup Co.
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Lancaster Iron Works, Inc.

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Spencer Lens Co.

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Corhart Refractories Co.
Denver Fire Clay Co.
Louthan Mfg. Co.
Norton Co.

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Corhart Refractories Co.
Denver Fire Clay Co.
Louthan Mfg. Co.
Norton Co.
Thomas Alabama Kaolin Co.

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Drakenfeld, B. F., & Co.
The Hommel Co., O., Inc.

Rutile
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Foote Mineral Co.
Harshaw Chemical Co.
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Metal and Thermit Corp.
The Vitro Mfg. Co.

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Norton Co.
Potters Supply Co.

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The Vitro Mfg. Co.

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Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
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Sodium Nitrite
Harshaw Chemical Co.
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Sodium Silica Fluoride
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The Vitro Mfg. Co.

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Potters Supply Co.

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Harshaw Chemical Co.
The Hommel Co., O., Inc.
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Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
The Hommel Co., O., Inc.
Metal & Thermit Corp.
The Vitro Mfg. Co.

Titanium
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Titanium Oxide
Ceramic Color & Chemical Mfg. Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
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Hammill & Gillespie, Inc.
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The Hommel Co., O., Inc.
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Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
Harshaw Chemical Co.
The Hommel Co., O., Inc.
The Vitro Mfg. Co.

Zircon
Edgar Plastic Kaolin Co.
Foote Mineral Co.
The Hommel Co., O., Inc.

Zirconia
Ceramic Color & Chemical Mfg. Co.
Du Pont de Nemours, E. I., & Co., Inc., R. & H. Chemicals Dept.
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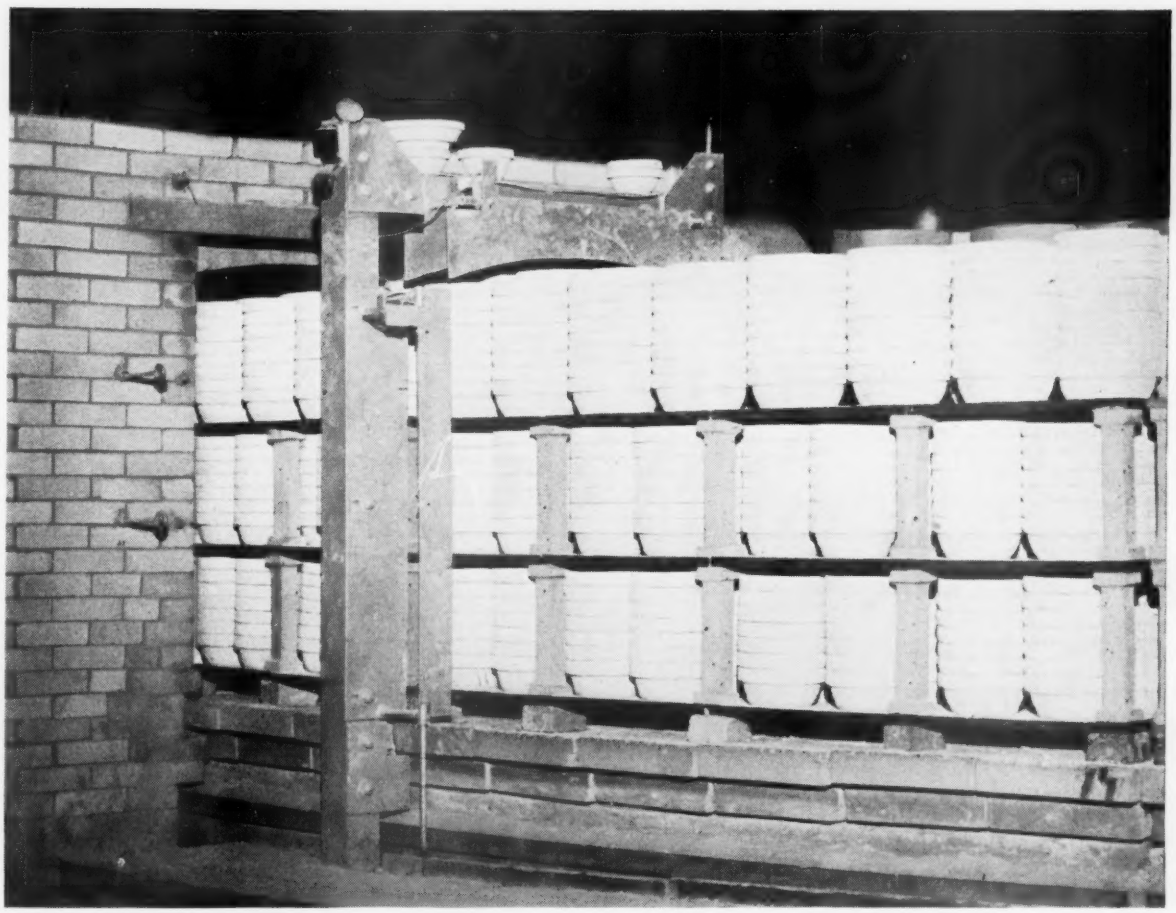

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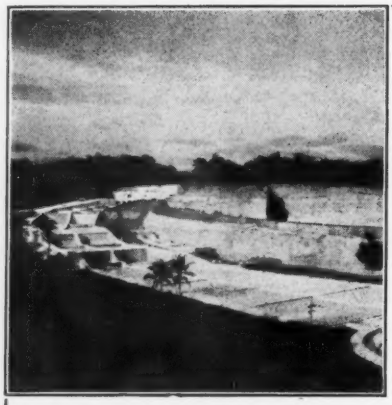

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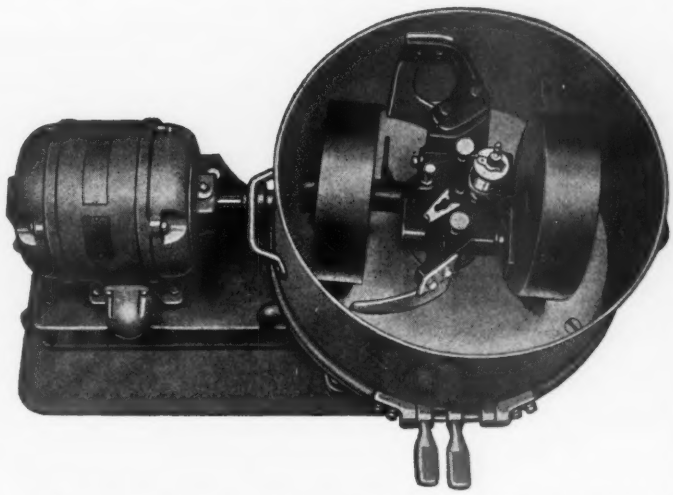

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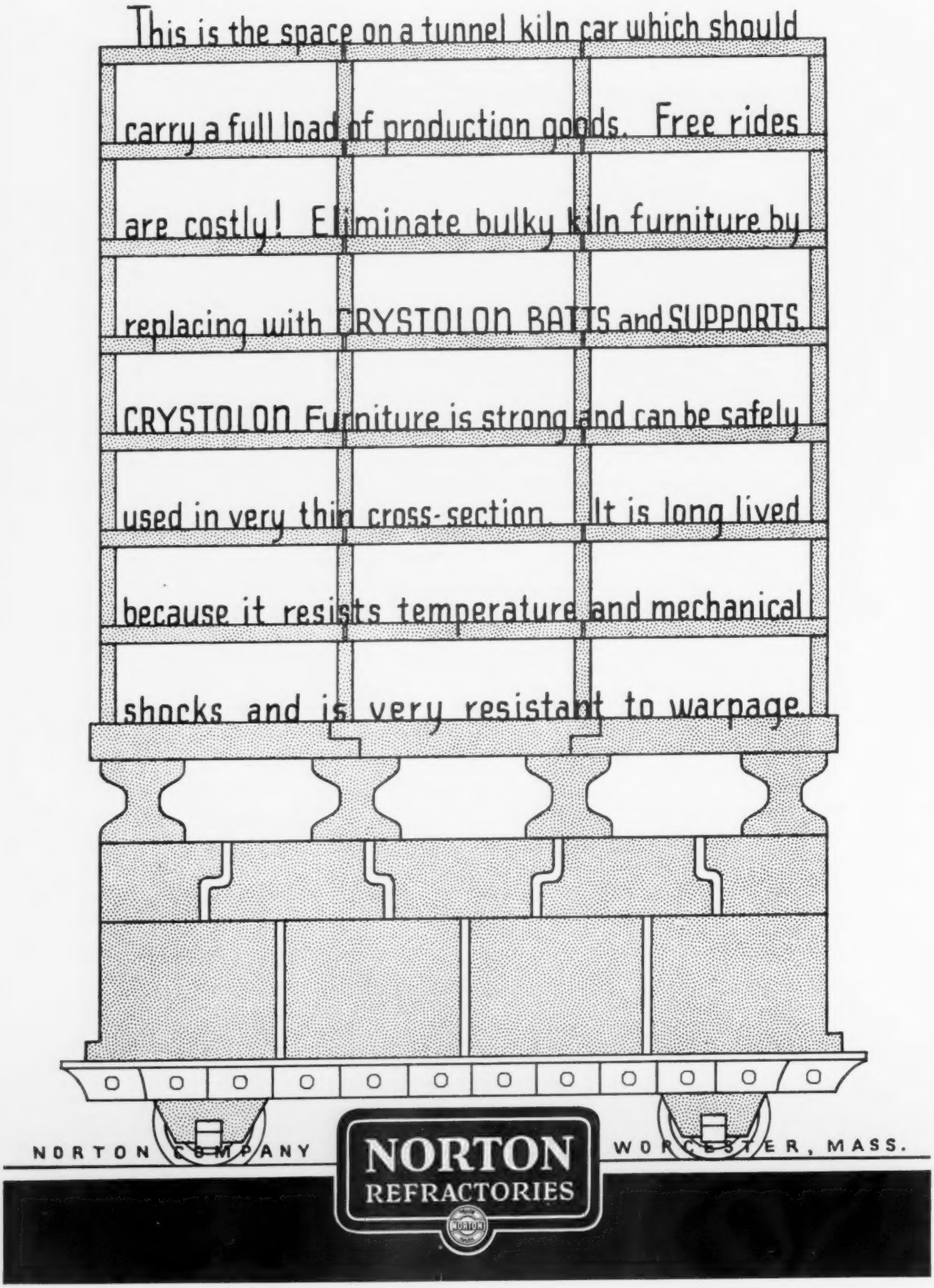
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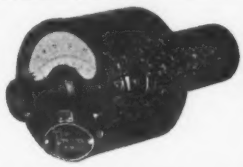

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